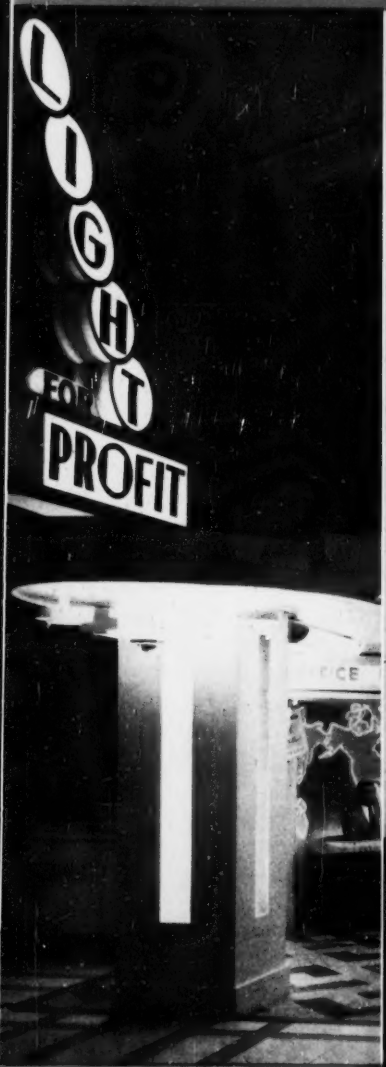
ELECTRICAL WORLD

A McGRAW-HILL PUBLICATION

JULY 30, 1949



HOW TO SELL
COMMERCIAL • INDUSTRIAL
RESIDENTIAL LIGHTING
Told by Winners of
Planned Lighting Award Contest
and
HOW TO SELL STREET LIGHTING

THE MAN
WHO PLANS

Listed by Underwriters' Laboratories Inc.

Do *Your* "20 Amp." Circuit Breakers Carry 20 Amps. Continuously?

Even in

COMPACT PANEL BOXES?

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DIRECT SUNLIGHT?

NOT if they trip by Thermal Elements!

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This 8 circuit load center comes with 4, 6 or 8 Murray *Fully Magnetic* Breakers. Also available are 2 circuit and 4 circuit load centers.

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Single pole breakers in 10, 15, 20, 25, 30, 35 and 50 amp. ratings. Only two handle positions — Off and On.

Each breaker can be *individually* replaced with breaker of same, lower or higher rating

Get the full facts on Murray *Fully Magnetic* Circuit Breakers. Operating characteristics and construction features are given in this informative folder. Write for your copy now.

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Equip Today!

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SERVICE ENTRANCE & METER EQUIPMENT • MAGNETIC CIRCUIT BREAKERS
SWITCHES • CURRENT LIMITING REACTORS • CROWS'NEST AERIAL LADDERS

ELECTRICAL WORLD

Published for 75 years for those engaged in the business of generating, transmitting, distributing or applying electric power

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COVER PICTURE—Year round promotion of commercial lighting by men like E. R. Tschirn, commercial representative for New Orleans Public Service Inc, gave that company first prize in the commercial class of the 1948 Planned Lighting Award contest

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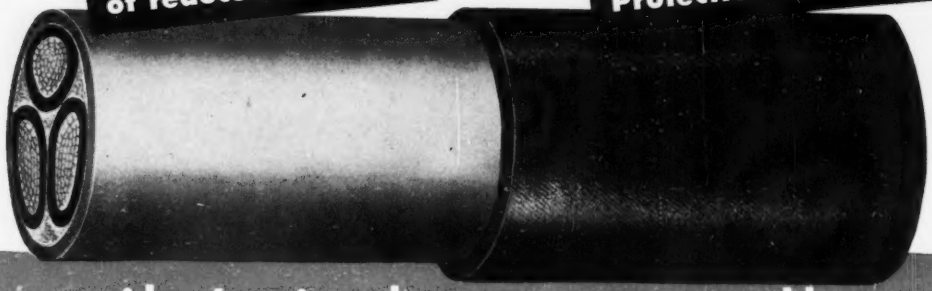
A STORY IN TWO PARTS . . . PART 2*

HOW OKOMETAL of reduced thickness PLUS OKOSHEATH Protective Covering



...provides 6 major advantages to paper cable users

*Continued from July 16, 1949 issue of ELECTRICAL WORLD

Okometal of reduced thickness plus Okosheath Protective Covering is a composite sheath of alloyed lead protected by a tough, reinforced neoprene covering vulcanized and firmly bonded to the lead. The result of long, intensive studies in Okonite-Callender Research Laboratories, this dual sheath provides six major advantages to a growing list of users.

In the previous issue of this magazine, we indicated how Okometal-Okosheath *doubles life expectancy, eliminates corrosion in lead-sheathed paper cables* and *reduces installation and maintenance costs.* The following three advantages complete the reasons why you should specify Okometal of reduced thickness plus Okosheath Protective Covering:

COMPARISON OF RELATIVE STRUCTURAL VALUES: With Okosheath Protective Covering, the 15% extra lead thickness normally required for scoring protection can be eliminated. The greater bursting strength, excellent creep resistance and increased resistance to bending fatigue of Okometal make a further reduction possible. Result: an over-all reduction of one-third in metal thickness still provides doubled life expectancy when this dual sheath is used.

HAS GREATER BURSTING STRENGTH: Internal pressure tests show that Okometal itself possesses higher bursting strength than ordinary lead sheaths, as well as excellent resistance to creep. The composite sheath with Okometal of reduced thickness withstands pressure tests three times as long as bare lead sheaths of standard thickness.

PREVENTS SCORING OF LEAD: A comparison of structural values (see diagram) shows how all the sheath metal is effective when Okosheath Protective Covering is used, and that no extra metal need be furnished for potential scoring damage. Okometal's greater bursting strength and resistance to creep and bending fatigue also contribute to making possible the one-third reduction of metal thickness while maintaining the same doubled life expectancy.

MAKES PULLING EASIER: Cables made with Okometal of reduced thickness plus Okosheath Protective Covering are easier to pull and handle because of their lower coefficient of friction and lighter weight. This suggests the use of longer cable lengths to reduce the number of manholes and joints. The metal sheath is also protected against damage during installation.

Comparative test results, explanatory diagrams and photographs, as well as more detailed information on this important development are available in Research Publication 110. Just write for your copy on your business letterhead. The Okonite Company, Passaic, N. J.

Compare this substantial dual construction with plain lead of same core diameter.

Okonite-Callender cables with this composite sheath meet all AEIC Test requirements for paper cables with plain lead of standard thickness.

7670

OKONITE-CALLENDER paper insulated power cables

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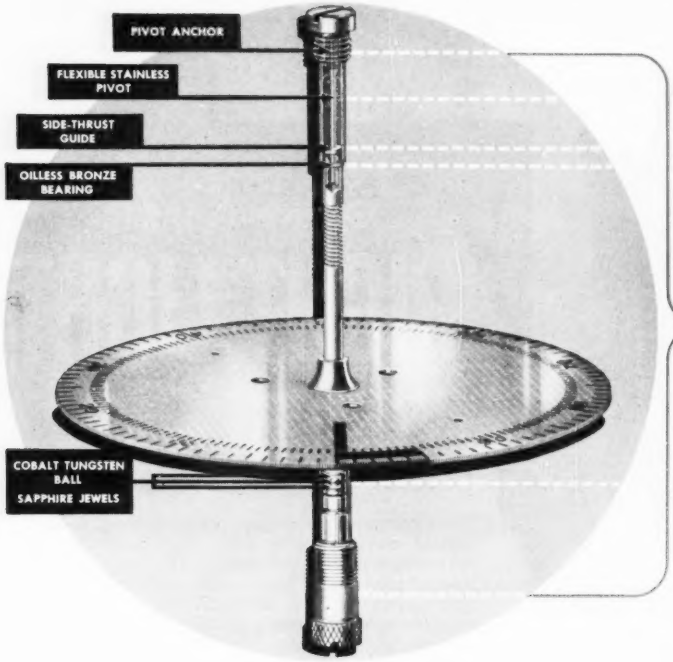

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Oilless Noiseless Troublefree

Sangamo J Watthour Meters

Sangamo J Meters are equipped with a modern improved *oilless, noiseless, non-corrosive bearing system—proved* by 9 years of troublefree service. As shown in the diagram above, the lower bearing assembly consists of a non-ferrous cobalt tungsten ball and two sapphire jewels, while the oilless upper bearing is a flexible, stainless steel pivot of a length designed to avoid frequency vibration and the resultant noise.

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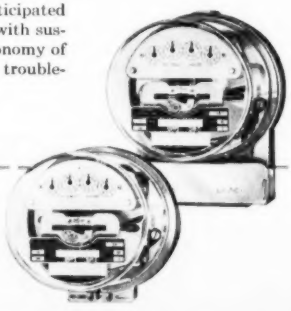
Sangamo J Meters have proved their ability to meet the requirements of today and the anticipated loads of the future with sustained accuracy, economy of maintenance and troublefree performance.



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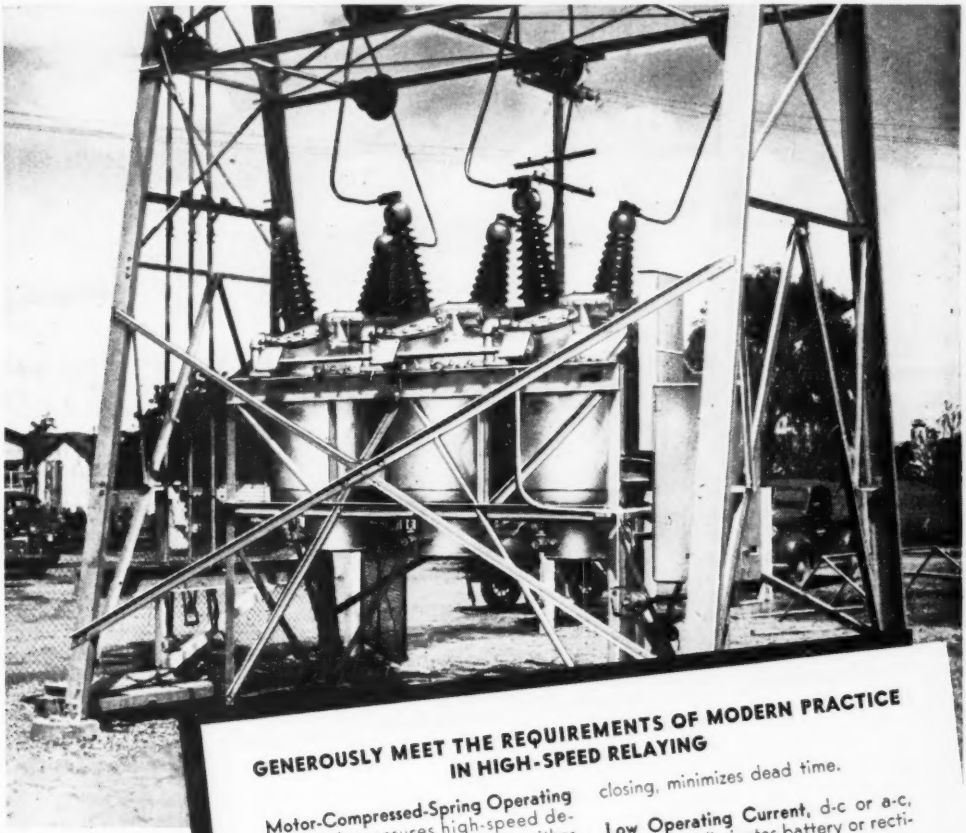

Type JE-42E
69 kv 600 amps
1,000,000 interrupting kva

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69 kv 1200 amps
1,500,000 interrupting kva

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Adopted Standards

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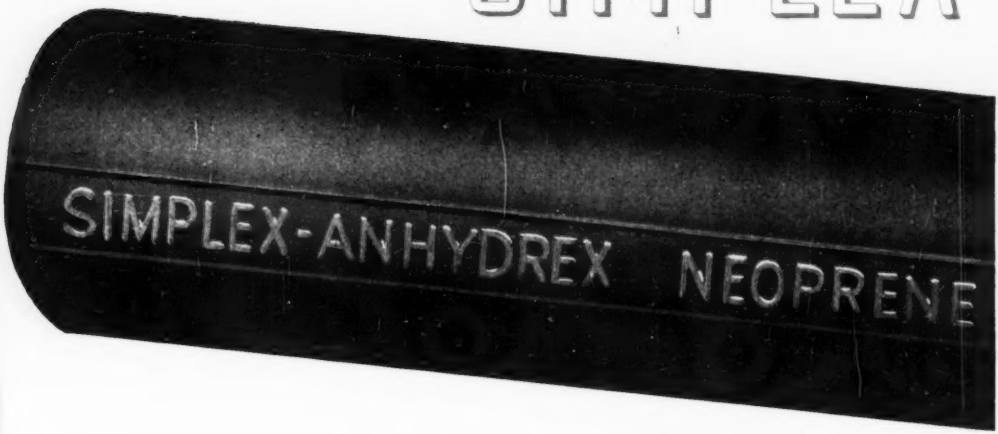

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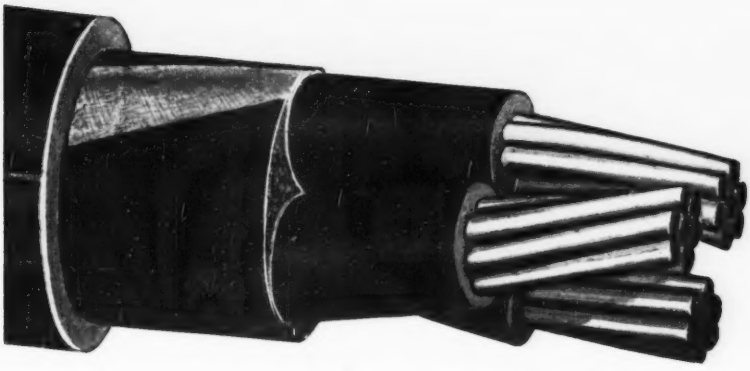
ANHYDREX XX



Simplex Laboratories

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Any cable which is put underground, either in ducts or otherwise, needs high resistance to water absorption. Simplex-Anhydrex **XX** has this resistance to a truly remarkable degree. We will guarantee that the maximum water absorption of Simplex-Anhydrex **XX**, after the severe aging test of 7 days in air oven at 250° F. (121° C.), will not exceed 15 milligrams per square inch of exposed surface when immersed in distilled water at 70° C. for 7 days.

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Westinghouse

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. . . modern answer to store lighting trends

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Westinghouse

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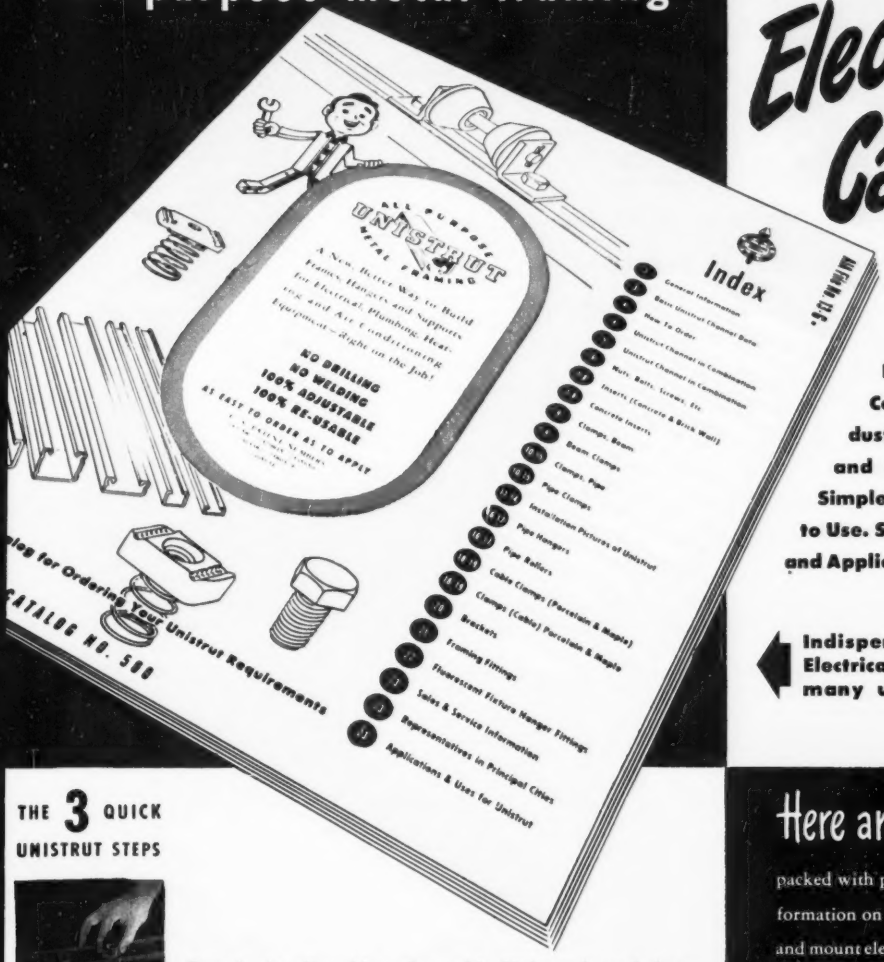
UNISTRUT

all purpose metal framing–



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GLOWTECTOR—indicates whether or not an electrical circuit, switch, etc., is dead or energized.

1. Glow from tube gives positive visual indication. No guesswork.
2. Only one electrode exposed to make contact. No auxiliary equipment or connections.
3. Use on 2200 Volt (line to ground) and above, 25 cycles and above.

CHECK the FACTS

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2. One man operation, test more units per day.
3. Complete in itself,—no leads or other equipment.
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IN CANADA—EASTERN POWER DEVICES LIMITED, TORONTO

The Check List

- CONDUCTOR SUPPORTS, CLAMPS AND FITTINGS
- DISCONNECTING SWITCHES INDOOR AND OUTDOOR
- HORN GAP SWITCHES
- INTERRUPTER SWITCHES
- CUTOUTS AND THERMO-RUPTERS
- DISTRIBUTION EQUIPMENT
- SWITCH OPERATING MECHANISMS
- SUBSTATIONS
- OPEN OR ENCLOSED ISOLATED PHASE HEAVY DUTY BUSES
- KIRK INTERLOCK SYSTEMS
- AUTOMATIC SWITCHING EQUIPMENT
- METAL CUBICLES
- TESTING DEVICES

Since telephone operators were boys...

BACK in the early '80's, when central office switchboards were manned by boy operators, Western Electric became the manufacturing unit of the infant Bell Telephone System. This has made sure of a source of good equipment, the kind required to provide dependable and economical telephone service.

Experience has proved the value of this to the public. For the Bell System network has grown vastly complex, yet its billions of parts—old and new—work perfectly together.

●As the Bell System network increases, it will continue to provide fine service largely because of the unified way Bell scientists *design*, Western Electric people *produce*, and telephone company people *operate* the equipment—a triple-action with one aim: good telephone service for you at a reasonable price.

MANUFACTURER of telephone apparatus for the Bell System.

PURCHASER of supplies for Bell Telephone companies.

DISTRIBUTOR of Bell telephone apparatus and supplies.

INSTALLER of Bell System central office equipment.

Western Electric

A UNIT OF THE BELL SYSTEM SINCE 1882

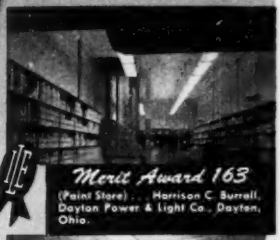
Merit Award with Distinction

MERIT AWARD WITH DISTINCTION. I.L.E. entry 330—(LEADER FIXTURES). H. E. Carney, Toledo-Edison Co., Toledo, Ohio. C. Hoke, Architect . . . Other LEADER MERIT AWARDS: Entries 163, 294, 381, 324 and 405.

Leader leads again

LEADER *Trofferlites*

Precision engineered — snug-fitting—and available in a wide range of dimensions and models for any structural requirement . . . For use singly or in continuous rows. Housing and channel of 20 gauge steel—open, glass-enclosed (specialized lenses available) baffled, or louvered. Instant-start available. Ask for details on LEADER'S prize-winning Troffers and other styles of LEADER prize-winning fluorescent fixtures.



Merit Award 163
(Paint Store) . . . Harrison C. Burrell, Dayton Power & Light Co., Dayton, Ohio.

Merit Award 294
(Drug Store) . . . A. A. Aronson, Northern States Power Co., Minneapolis, Minn. B. Perrson, Architects.

Merit Award 381
(Drug Store) . . . R. W. Gibb, Omaha Public Power Dist., Omaha, Neb.

Merit Award 324
(Office and Display Room) . . . George H. Seiter and Ronald Campbell, Cincinnati Gas & Electric Co., Cincinnati, Ohio.

Merit Award 405
(Bowling Alley) . . . Lucian T. Kight and E. J. Dunlap, Duquesne Light Co., Pittsburgh, Pa.

Multiple honors came to LEADER Fluorescent Lighting Fixtures in the 1949 I.L.E. competition. Small wonder: LEADER fixtures—soundly styled—lend themselves to ingenious lighting treatments—the sort that win judges' approval and the public's applause. But, in addition to their adaptability, LEADER fixtures are precision-made—durable. (LEADER destaticized moulded-plastic louvers are an example). Such durability is a LEADER plus-value that wins not only the blue ribbons of the moment, but those bestowed by Father Time!

No matter what your particular interest in good lighting, it is good sense to follow the LEADER. Let LEADER illuminating engineers light the way.

LEADER *Fixtures* —— Sold and installed only by the better electrical wholesalers and contractors.

LEADER ELECTRIC COMPANY
3500 N. KEDZIE AVENUE, CHICAGO 18, ILLINOIS
West Coast Factory: 2040 Livingston, Oakland 6, California

PROOF - *not Guesswork*

Makes FWD America's Foremost Heavy-Duty Truck

Here's actual operating proof by one of the nation's leading utilities! This FWD line construction unit is doing an everyday job — going through mud and clay to get to location. Yes — power and dependability needed for tough jobs like this are built right into every FWD Built-to-Code unit. You can be sure of this — even before you buy, because FWD Four and Six Wheel Drive Trucks are scientifically tested on FWD's proving ground to plow through mud and clay that reach over the bumper. *No wonder over 200 of the nation's top utilities use FWDs — with individual fleets up to 192 units!*

WHAT FWDs DO ON THE PROVING GROUND
1 Highball over hilly curved roads!
2 Slog thru mud — up to the bumper!
3 Speed over 100-ft. unbanked circle!
4 Twist over ditches —18 inches deep!
5 Drive up 6% grade thru 3-ft. of sand!
6 Climb 70% grade from dead stop!
7 Climb 8-in. beam from standstill!
8 Drill pole holes to prove equipment!
9 Speed safely over level highways!
1
2
3
5
6
7
8
9

This is FWD's proving ground. This is your assurance that the FWD you select has the stamina to insure long life without expensive mechanical breakdowns.

An FWD slogs through the "mud hole" at the proving ground. For all the facts about FWD Built-to-Code units, see your Graybar distributor — or write FWD.

An Invitation To Truck Buyers

We invite you to watch FWDs pass a series of rigid performance tests. Ask your FWD distributor to arrange your visit to our plant. Or — if you can't get away, ask him to show you the movie, *The FWD Story*. In either case, you will see for yourself how FWD trucks can help solve your heavy-duty trucking problems.

President
The Four Wheel Drive Auto Company

THE FOUR WHEEL DRIVE AUTO COMPANY
Clintonville, Wis. • *Canadian Factory:* Kitchener, Ontario
FOUR AND SIX WHEEL DRIVE TRUCKS

America's Foremost Heavy-Duty Truck

PITTSBURGH PERMAFLECTOR LIGHTING EQUIPMENT.....

"INTERNATIONAL" *Favorite*

More discriminating users selected Pittsburgh Permaflector Lighting Equipment for their Gold Seal and Merit Awards than that equipment of any other manufacturer.

Over 20% of the Gold Seals awarded at the 3rd International Lighting Exposition for outstanding lighting installations, incorporated Pittsburgh Permaflector Equipment.

This record of achievement is evidence that creatively and practically "Pittsburgh Permaflector" is preferred by men who know lighting best.

If you too want to achieve superior lighting results, our Engineering Department will gladly assist you. Write today.

GOLD SEAL AWARD to:
J. L. Phillips, Electrical Engineer
for EXCHANGE NATIONAL BANK
Warren, Knight & Davis, Architects

GOLD SEAL AWARD to:
Paul E. Keys, Duquesne Light Co.
for S. H. DEROY, Jewelers
Hyman Rosenberg, Architect

"Pittsburgh" Permaflector

PITTSBURGH REFLECTOR COMPANY

408 Oliver Bldg. Pittsburgh 22, Pa.

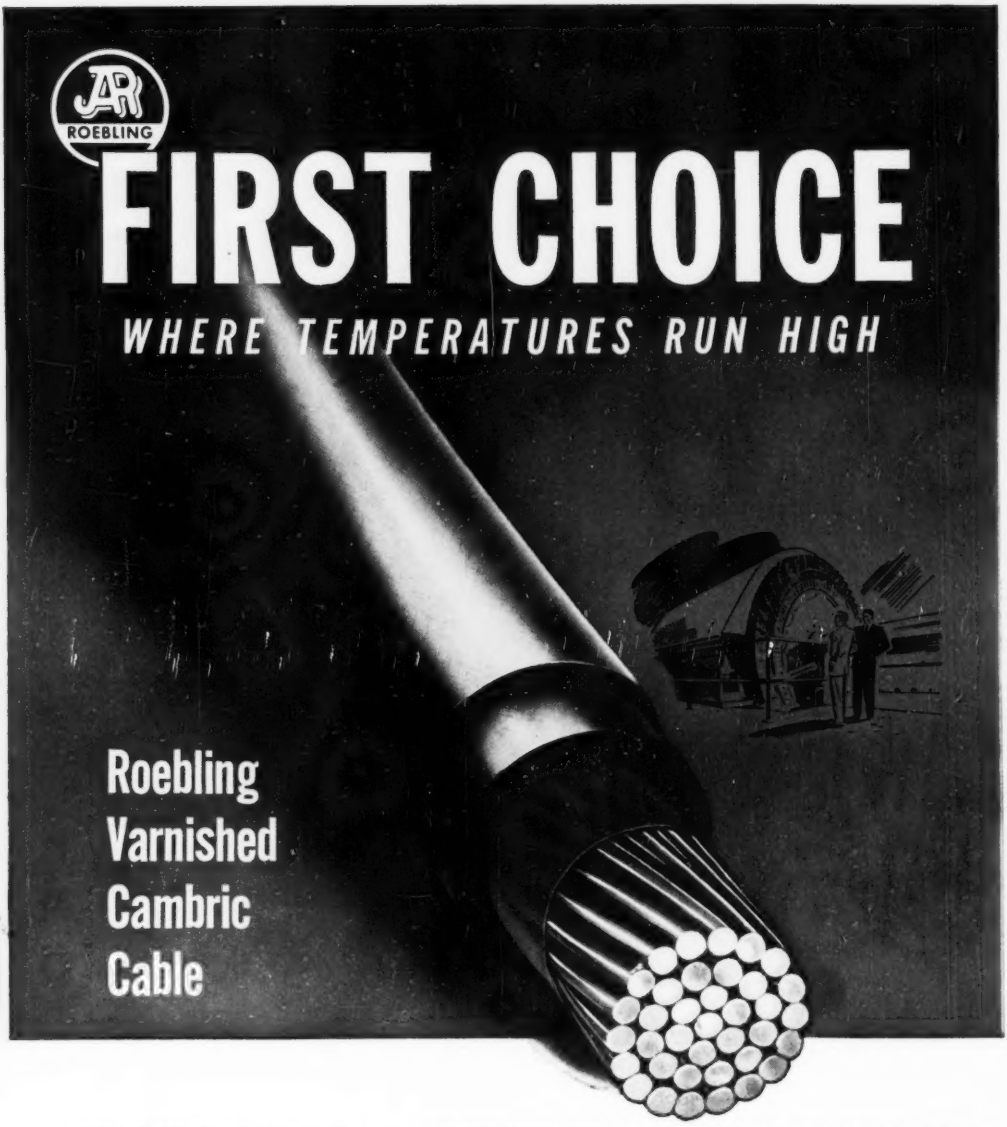
Permaflector Lighting Engineers in All Principal Cities

PITTSBURGH PERMAFLECTOR LIGHTING EQUIPMENT IS DISTRIBUTED BY BETTER ELECTRICAL WHOLESALERS EVERYWHERE

JR ROEBLING

FIRST CHOICE

WHERE TEMPERATURES RUN HIGH



HEAT RESISTANCE YOU CAN COUNT ON

FOR TOPFLIGHT DEPENDABILITY where heat is a hazard, turn to Roebling Varnished Cambric Cable! You'll find it far superior to rubber-insulated cables for motor and generator leads and it is outstandingly adapted for transformer and oil switch leads.

Roebling Varnished Cambric Cable comes in single and multiple conductor types—single, from 2,000,000 C. M. to No. 14 A.W.G. Designed for use up to 17,000 volts between phases for unshielded multiple conductor . . . up to 21,000 volts between phases for single conductor and shielded cables on ungrounded neutral systems . . . up to 28,000 volts between phases for single conductor and shielded cables on grounded neutral systems.

Write for full information, or get in touch with your Roebling Distributor who will gladly help. John A. Roebling's Sons Company, Trenton 2, N. J.

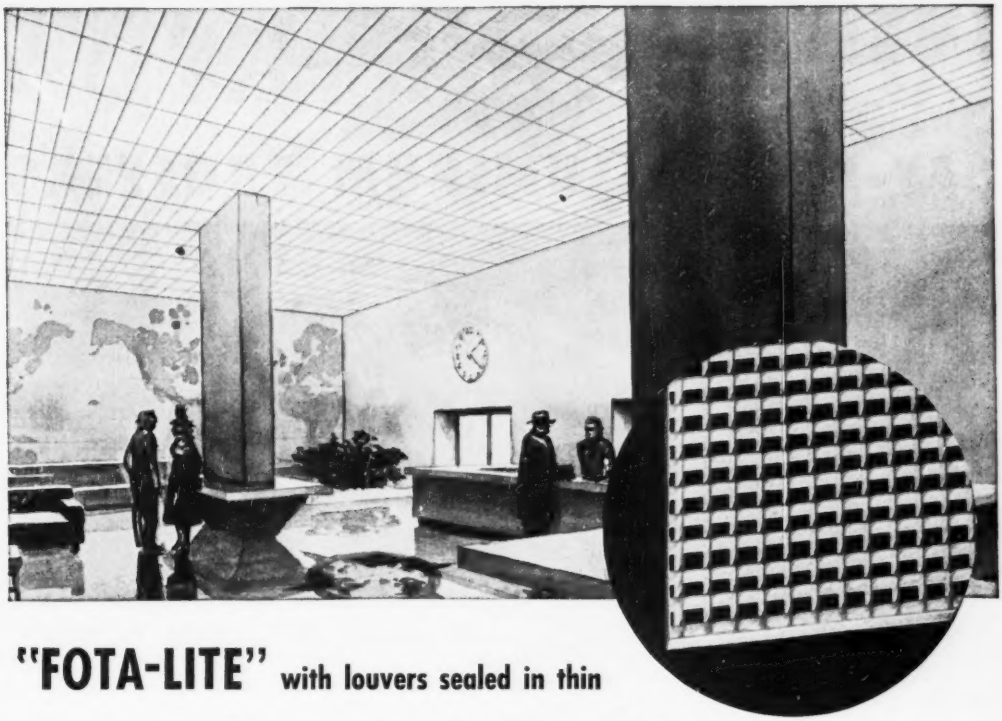
WRITE OR CALL THE ROEBLING FIELD MAN AT YOUR NEAREST ROEBLING OFFICE AND WAREHOUSE

Atlanta, 934 Avon Ave. ★ ***Boston,*** 51 Sleeper St. ★ ***Chicago,*** 5525 W. Roosevelt Rd. ★ ***Cleveland,*** 701 St. Clair Ave., N. E. ★ ***Denver,*** 1635 17th St. ★ ***Houston,*** 6216 Navigation Blvd. ★ ***Los Angeles,*** 216 S. Alameda St. ★ ***New York,*** 19 Rector St. ★ ***Philadelphia,*** 12 S. 12th St. ★ ***Pittsburgh,*** 855 W. North Ave. ★ ***Portland, Ore.,*** 1032 N. W. 14th Ave. ★ ***San Francisco,*** 1740 17th St. ★ ***Seattle,*** 900 First Ave.

ROEBLING

☆ *A CENTURY OF CONFIDENCE* ☆

SOMETHING NEW IN HIGH LEVEL ILLUMINATION!



"FOTA-LITE" with louvers sealed in thin smooth glass, gives you a clean, dust-tight installation

"FOTA-LITE," Corning's newest lighting glassware, is designed for efficient high level illumination. Instead of bulky, hard to clean materials, you control light distribution with louvers *sealed in a thin panel* of glass. Thus, fixtures can be made shallower and dust-tight. The smooth surface of "Fota-Lite" can be wiped clean quickly. Original efficiency remains unimpaired.

Due to a cell size many times smaller than conventional louvering materials, this glass, in a fixture, has the appearance of plain opal. However, light directed vertically passes almost unrestricted through the clear sections.

Strong, light in weight, free of warpage and available in standard or special patterns, "Fota-Lite" combines many advantages which radically improve louver panel lighting. It is also non-color selective, important in maintaining true color values. Ask for Bulletin LS-24.

LOUVERED GLASS FOR MODERN LIGHTING—A NEW LOUVERING MATERIAL

CORNING means research in GLASS

T.M. REG. PYREX U.S. PAT. OFF.

CORNING GLASS WORKS
Lighting Sales Department
Corning, New York

SALES OFFICES:
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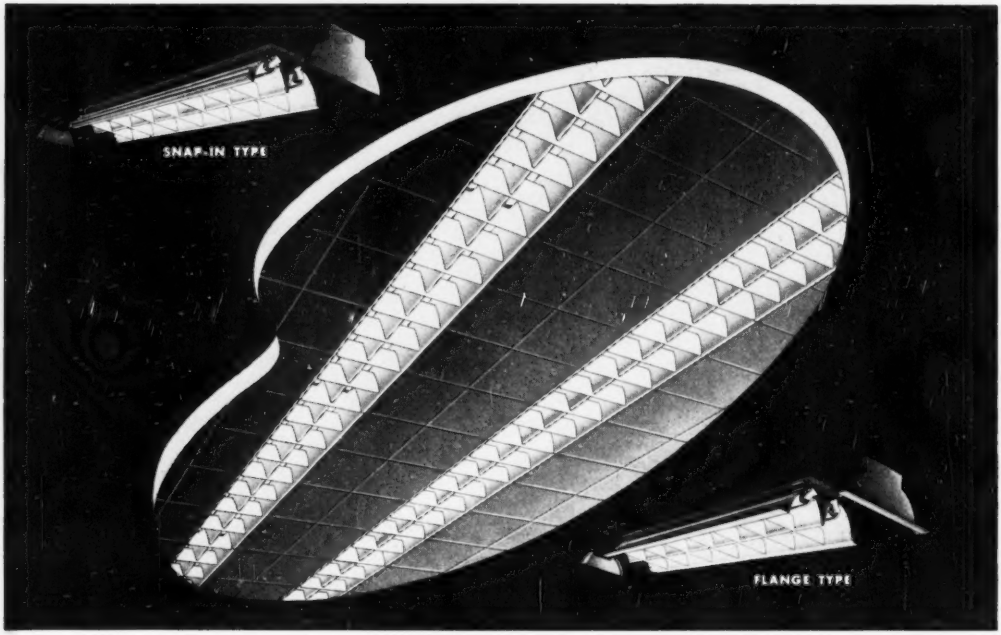
CORNING GLASS WORKS, Dept. EW-7, CORNING, N.Y.
Please send Bulletin LS-24, describing Fota-Lite.
NAME_____ TITLE_____
COMPANY_____
ADDRESS_____
CITY_____ ZONE____ STATE_____

DE LUXE LIGHTING FROM AN INCONSPICUOUS SOURCE...

LOW BRIGHTNESS

DAY-BRITE ALUMINUM TROFFERS



FUNCTIONAL...AND HARMONIOUS!

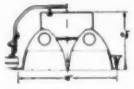
Day-Brite diffuse Alzak aluminum troffers provide extremely low contrast between light source and surrounding ceiling. That means smooth, *unobtrusive* lighting without blare or glare . . . a fixture that lends subtle beauty to architectural treatments.

And!. . . the parabolic design provides *accurate control* of light distribution. Light weight, durable, easy to install and maintain . . . these Day-Brite aluminum troffers are setting the pace where premium lighting at economical cost is called for.

Right now . . . TODAY. . . write for descriptive Bulletin 20-B. Address Day-Brite Lighting, Inc., 5125 Bulwer Ave., St. Louis 7, Missouri. In Canada: Amalgamated Electric Corp., Ltd., Toronto 6, Ontario.

DISTRIBUTED NATIONALLY BY LEADING ELECTRICAL WHOLESALERS

DAY-BRITE ALUMINUM RECESSED TROFFERS



For two 40-watt fluorescent lamps . . . single unit or continuous installations. Snap-in type for Tee-Bar construction and flange type for acoustical or plaster ceilings. Wired with certified ballasts (ETL approved), sockets, and NO-BLINK type starters. Knockouts provided for feed connections. Louver assembly is supported by spring tension clips for easy removal and replacement without tools.

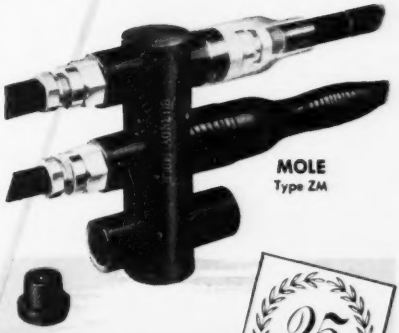
IT'S EASY TO SEE WHEN IT'S

DAY-BRITE *Lighting*

339

UNDERGROUND

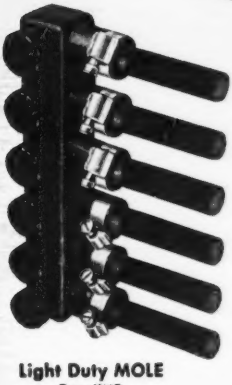
Burndy underground connectors have been time-tested for over a decade in actual service. Preferred because of their rapid installation, flexibility, and low cost. All pre-insulated to eliminate taping wherever possible. Ask for the Mole Line Catalog, or engineering assistance. BURNDY Engineering Company, New York 54, N. Y. WESTERN BRANCH: Vernon 11, California.



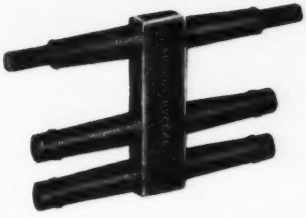
MOLE
Type ZM

25 YEARS OF SERVICE

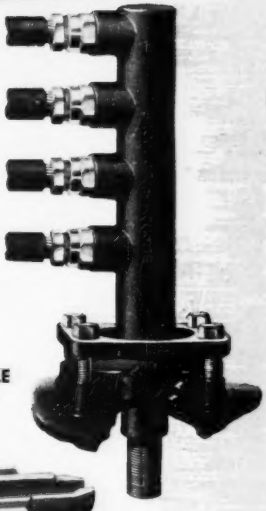
Connect with
BURNDY



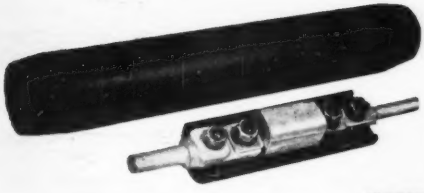
Light Duty MOLE
Type KME



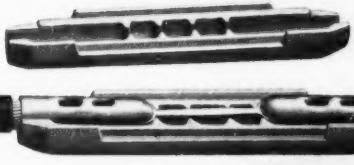
HYCRAB
Type YM



STUD MOLE
Type ZMLD



Replaceable Link MOLIMITER
Type LYM

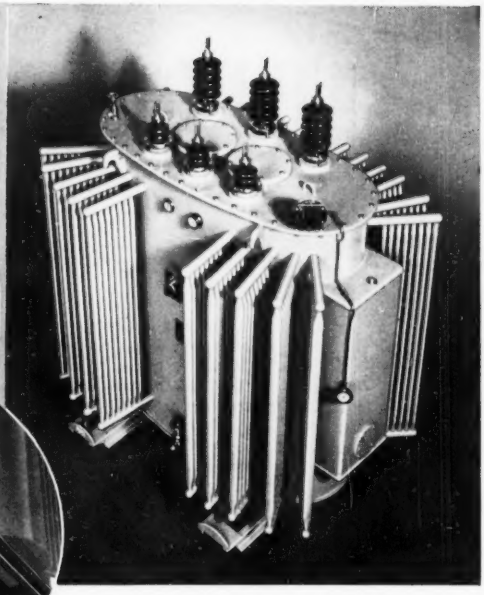


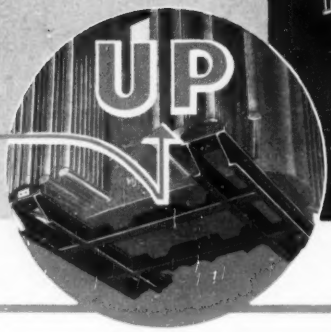
LIMITER
Type YFS

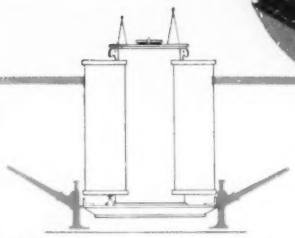
Pennsylvania
STANDARD PARTS POWER TRANSFORMERS

Designed Right... Built Right...

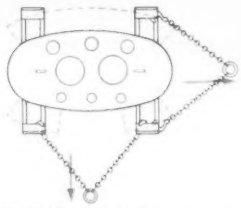
FROM THE BOTTOM UP



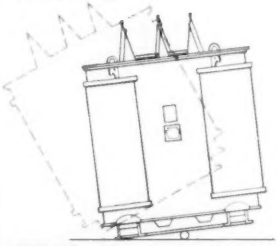




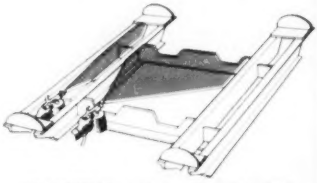
JACKING — Structural steel base members extend to ends of radiators. Radiators offer no interference to jacking. Clearance provided for base of jack to extend under jack lugs. This allows toe of jack to enter all the way under jack lug.



PULLING — Jack lugs are constructed so that a standard hook can be placed in the jack lug to pull the transformer in any direction.



TIPPING — Base design takes into consideration transformer's center of gravity. The largest rolls used cannot tip transformer past its center of gravity.



PAINTING — Ports are provided in base members to ventilate bottom of transformer tank, and to facilitate complete painting of the base and tank bottom. Rust will not attack the tank bottom under these conditions.

Now available in the following sizes:

Three Phase: Up to 10,000 Kva, 34 Kv.
Single Phase: Up to 5,000 Kva, 34 Kv.

A NEW, IMPROVED structural steel base represents one of the outstanding design features in Pennsylvania's new line of Standard Parts Power Transformers.

This base was designed by Pennsylvania Development Engineers after a thorough study of the requirements of a representative group of transformer users. The sketches illustrate how this new base simplifies jacking, pulling, rolling and painting.

Here is another concrete example of Pennsylvania's Engineering Ingenuity.

You'll discover something new if you write for Booklet No. 1492.

Look to Pennsylvania Standard Parts Power Transformers for *lower prices* and *faster deliveries*.

Inert Gas-Oil Seal | Sealed Tank | Inert Gas Pressure

Pennsylvania
TRANSFORMER COMPANY
PITTSBURGH 12, PENNSYLVANIA

NOW GET THE ANSWERS on Aerial Cable

- *What is Preassembled Aerial Cable?*
- *Where to use Preassembled Aerial Cable*
- *Field-assembled Aerial Cable*
- *Special Advantages of Super Coronol® Aerial Cable*
- *Guide to Correct Selection*
- *Electrical Characteristics*
- *Messenger Characteristics*
- *Detailed Installation Procedure*
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In one fact-packed volume you can now find the answers to your major problems on preassembled and field-assembled aerial cable. Specific, how-to-do-it information and recommendations, illustrations of techniques, and data for computations are all to be found in this 26-page bulletin.

For your free copy mail coupon now

GENERAL ELECTRIC

Section W47-827
Construction Materials Department
General Electric Company
Bridgeport 2, Connecticut

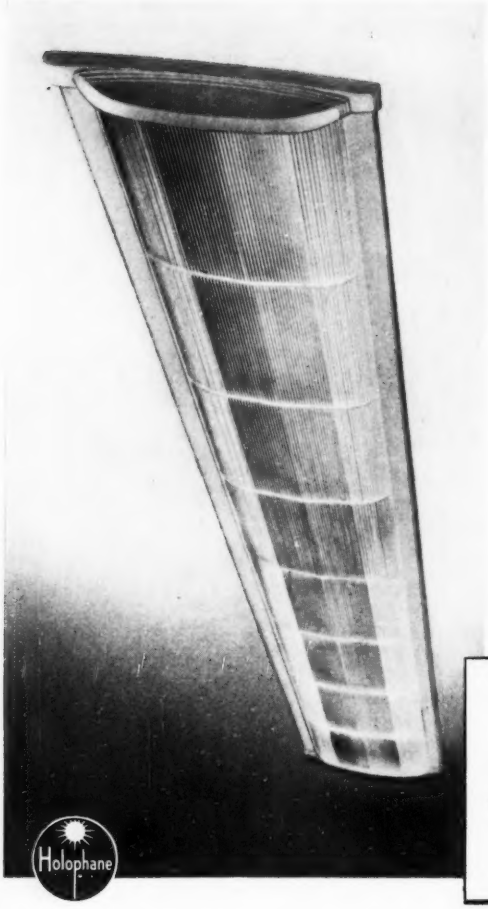
Please send me a copy of your bulletin, ***SUPER CORONOL Aerial Cable Preassembled and Field-assembled.***

Name _____ Title _____

Company _____

Address _____

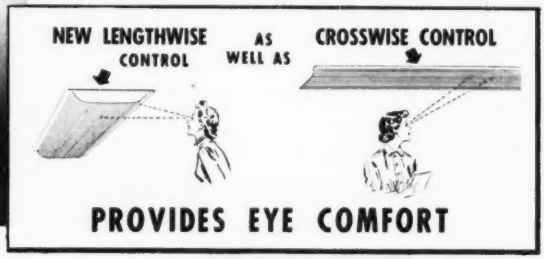
City _____ Zone ____ State _____



NEW HOLOPHANE CONTROLENS*

NO. 9200

Takes the GLARE out of FLUORESCENT LIGHTING



Holophane research presents an entirely new concept of light control with this new CONTROLENS. Adding *LENGTHWISE* control to crosswise control of light, it affords the utmost in visibility, comfort, economy . . . Efficiency inherent in fluorescent lamps can only be retained by scientific control of light which *cuts off* glare while *building up* light on the work. New CONTROLENS No. 9200 is as attractive as it is efficient. The lens is remarkably light in weight despite its great strength and resistance to breakage. Unit constructions are diversified to allow full planning freedom as to installation methods, lamp capacity, and switching arrangements.

SCIENTIFICALLY SHIELDS AND CUTS OFF GLARE FROM EVERY POINT OF VIEW
CONCENTRATES LIGHT ON THE WORK — REDIRECTS LIGHT TO THE EYES

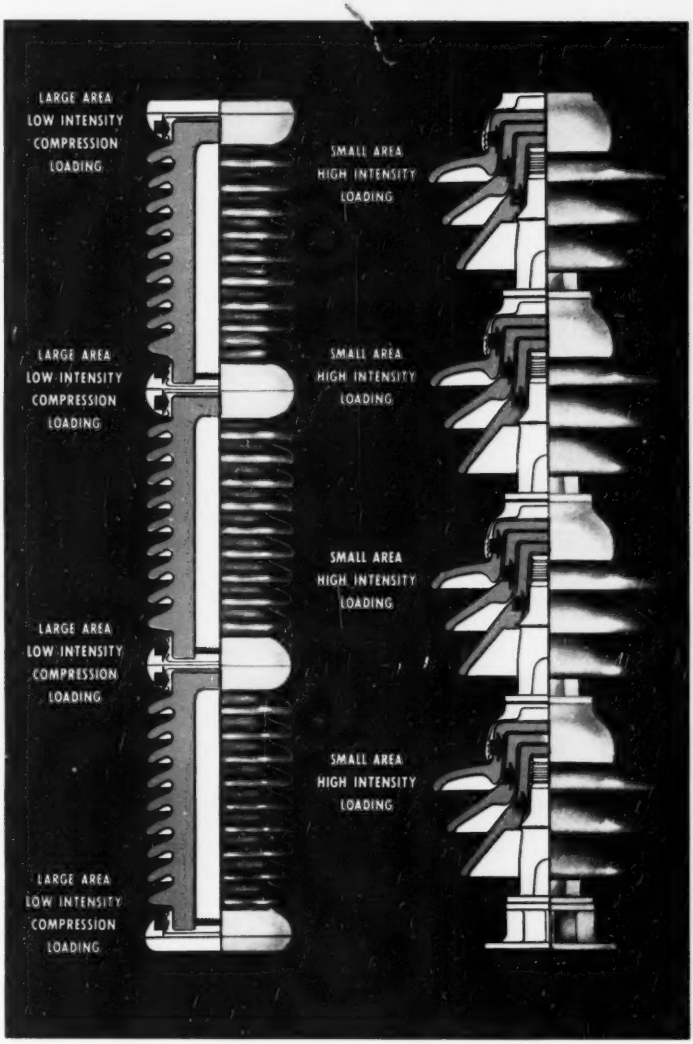
Write for Interesting Brochure and engineering data on New CONTROLENS development

*Reg. U. S. Pat. Off.

HOLOPHANE COMPANY, INC.

Lighting Authorities Since 1898 • 342 MADISON AVENUE, NEW YORK 17, N.Y.

THE HOLOPHANE COMPANY, LTD., THE QUEENSWAY, TORONTO 14, ONTARIO

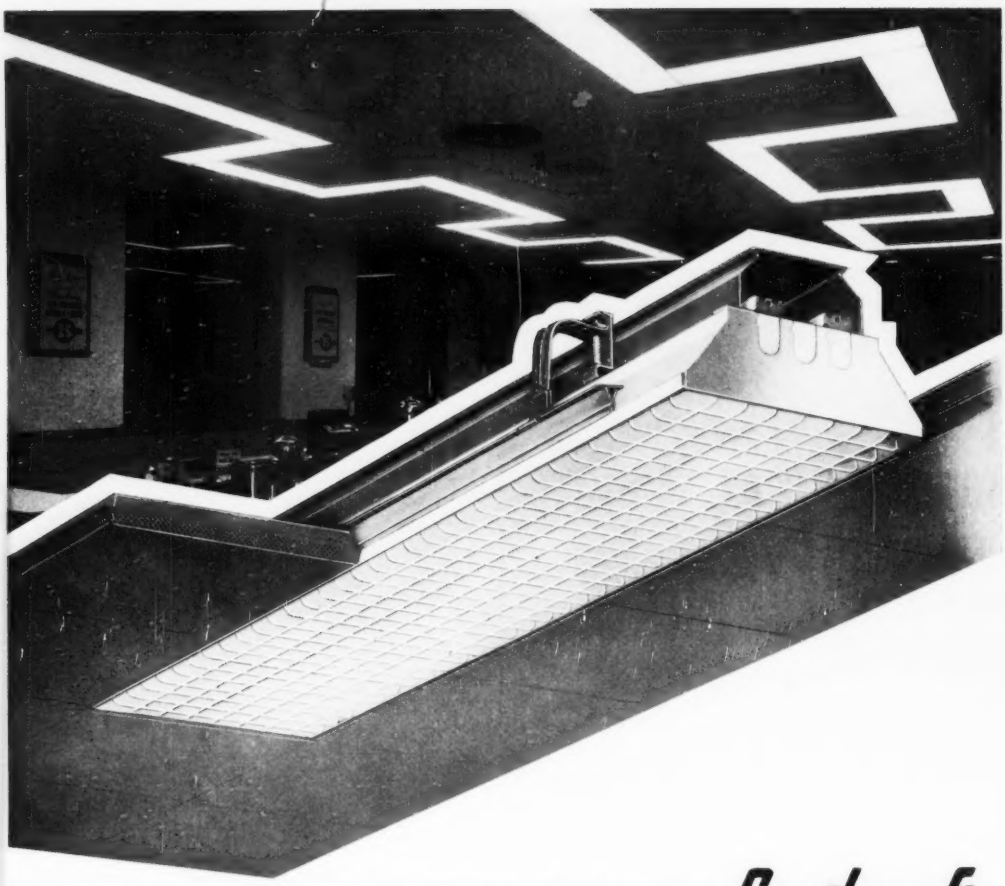


Consider MECHANICAL LOADING IN STATION POSTS

There's a fundamental difference between the design of the Lapp Station Post and that of the conventional pin-cap station insulator. In the 138-161 Kv units sketched above, for example, compare the *six* cemented joints of the Station Post—metal caps externally mounted, to load porcelain only in compression—with the pin-cap unit and its *twelve* nested porcelain shells, all depending on tension strength of the porcelain—its weakest characteristic. That's a difference of design that means a difference in performance . . . in length of life . . . in frequency of outages . . . in cost of station maintenance. For switch and bus support at all voltages up to 161 Kv, the specification "Lapp Station Posts" is a guarantee of extra operating security.

Lapp STATION POSTS

LAPP INSULATOR CO., INC. • LE ROY, N.Y., U. S. A.



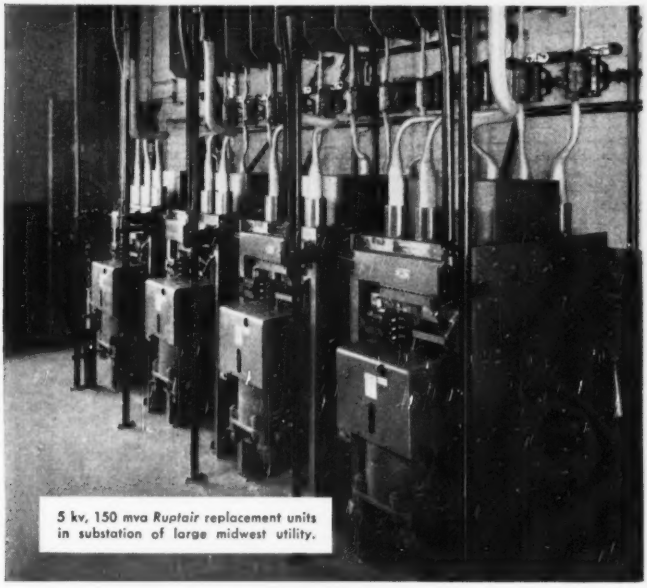
SPECIFICATIONS: TROFFERS SHALL BE *Smithcraft*
~~**OR EQUAL**~~

there is no equal!

**THERE'S A BOOKLET ENTITLED "ARCHITECTURAL TROFFERS"
THAT TELLS YOU WHY**

write..... ***Smithcraft*** **LIGHTING DIVISION, CHELSEA 50, MASS.**

Introducing...RUPTAIR REPLACEMENT UNITS!

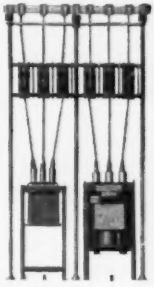


5 kv, 150 mva *Ruptair* replacement units in substation of large midwest utility.

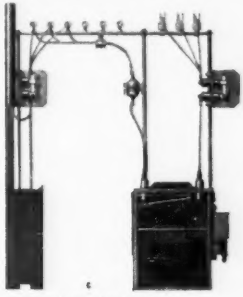
Typical Modernization Application:

You salvage everything but the obsolete breaker when you install *Ruptair* replacement units. New current transformers, disconnect switches, or buses are usually unnecessary.

A.) Typical open type iron pipe framework used with oil type circuit breaker and other switchgear components.



B.) New *Ruptair* unit replaces obsolete circuit breakers without disturbing buses, disconnect switches, instrument transformers.



C.) Side view of installation B.

- **IMPROVE CIRCUIT PROTECTION**
- **REDUCE MAINTENANCE**
- **MODERNIZE INADEQUATE FACILITIES**

NOW YOU CAN REPLACE obsolete, worn out, low capacity oil breakers with *modern Ruptair* circuit breakers. These Vertical-lift Replacement Units are the logical way to get reliable protection with minimum expense, installation time and station modification.

Utilities can increase station interrupting capacity, meet modern power distribution requirements with these new units.

The Vertical-lift *Ruptair* circuit breaker is oilless, reduces fire hazard, requires little maintenance. Attached wheels make possible inspection and maintenance remote from the unit.

Unit is easily installed in existing concrete or masonry cells or in open-type iron pipe framework. Comparative low height makes it applicable to small existing structures. Vertical-lift design simplifies connection of bushings to existing bus or cable at minimum cost.

Voltage ratings 2300 and 4160 volts, interrupting capacities 100, 150, 250 mva. Current capacities 1200 and 2000 amperes, a-c or d-c solenoid operation.

Call your A-C sales office or write direct for new Bulletin 18B7094.

Ruptair is an Allis-Chalmers trademark.

ALLIS-CHALMERS

First in the U. S. with Metal-Clad Switchgear

ALLIS-CHALMERS, 932A SO. 70 ST. MILWAUKEE, WIS.

Please send new bulletin 1887094 on *Ruptair* replacement unit.

Name

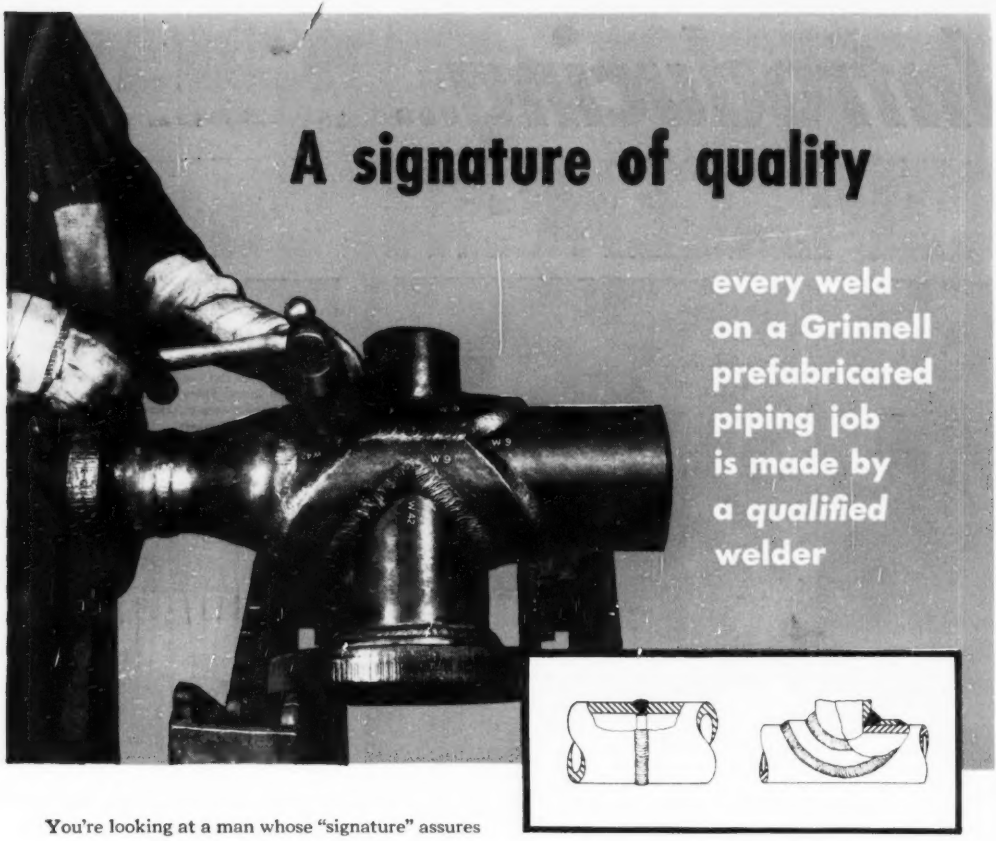
Title

Company

Address

City State

A-2747



You're looking at a man whose "signature" assures quality welding of piping. He's a Grinnell welder and, as every Grinnell welder, he is qualified by Grinnell according to a procedure which conforms to A.S.M.E. Boiler Construction Code, Section 9. After qualifying, he is given a number which he "signs" adjacent to each weld he makes.

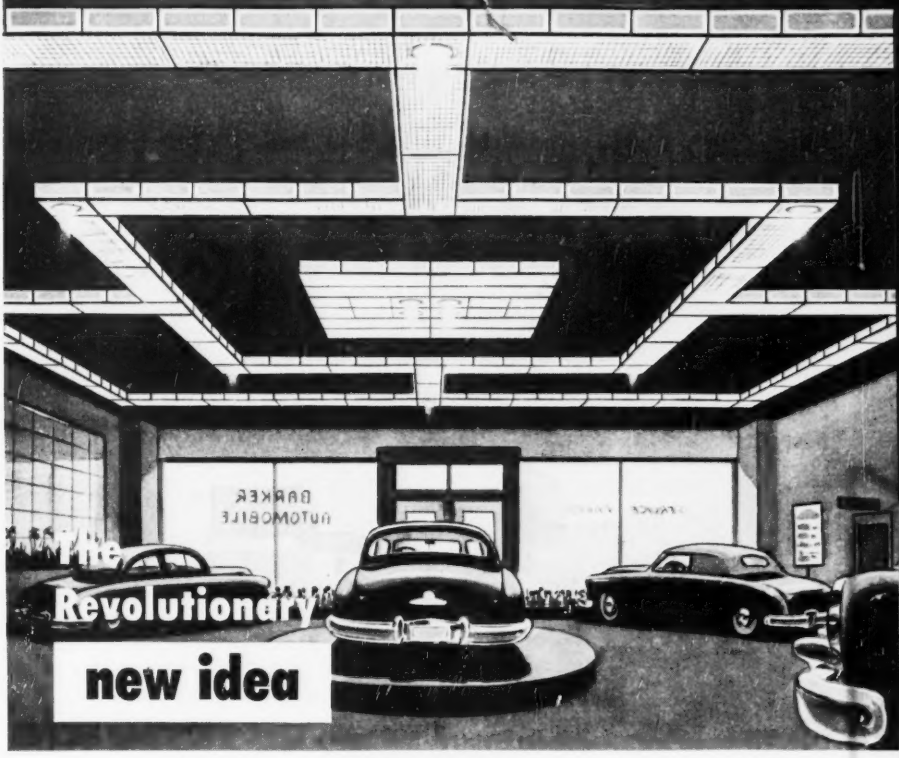
Quality welding is only one of a long chain of responsibilities assumed by Grinnell on every prefabricated piping job . . . from the interpretive engineering to the on-time delivery of the fabricated piping. Such responsibility requires facilities for metallurgical research and testing, comprehensive knowledge of state laws and industry codes, and a complete familiarity with insurance company requirements for fabricated piping.

The fabrication of piping for today's high pressure, high temperature or corrosive services is a job for experts. It's a job for Grinnell prefabricating plants because Grinnell has the modern equipment and methods, and the skilled personnel which enable them to assume total responsibility for the job.

99 YEARS PIPING

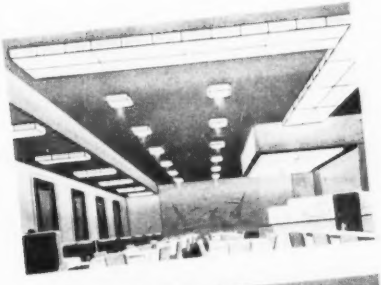
GRINNELL

Grinnell Company, Inc., Providence, Rhode Island. Branches: Atlanta • Buffalo • Charlotte • Chicago • Cleveland • Cranston • Fresno • Kansas City • Houston Long Beach • Los Angeles • Milwaukee • Minneapolis • New York • Oakland • Philadelphia • Sacramento • St. Louis • St. Paul • San Francisco • Seattle • Spokane



in Lighting *IS HERE*

MITCHELL **module**
REG U S PAT OFFICE



The Custom-Fitting Lighting System

The new era in commercial lighting is born—with the first application of the modular principle to lighting! Developed by MITCHELL, MODULE is the *first* and *only* mass produced fluorescent lighting system that easily and economically achieves the results of the finest custom-built installations. MODULE is not merely "another fixture". It is the fundamentally different, the truly revolutionary new idea in lighting that combines in one single system *all* these unprecedented advantages:

- **Makes possible limitless pattern designs**
- **Custom-fits any room shape or proportions**
- **Provides unlimited linear flexibility**
- **Mixes many light sources in one uniform system**
- **Features equal low brightness throughout**
- **Provides harmonious matched appearance throughout**

Write today for free 20-page MODULE brochure which gives every detail of this exciting new lighting development. Use coupon at right.

MITCHELL MANUFACTURING COMPANY
2525 Clybourn Avenue, Chicago 14, Illinois

Send full details on MITCHELL MODULE

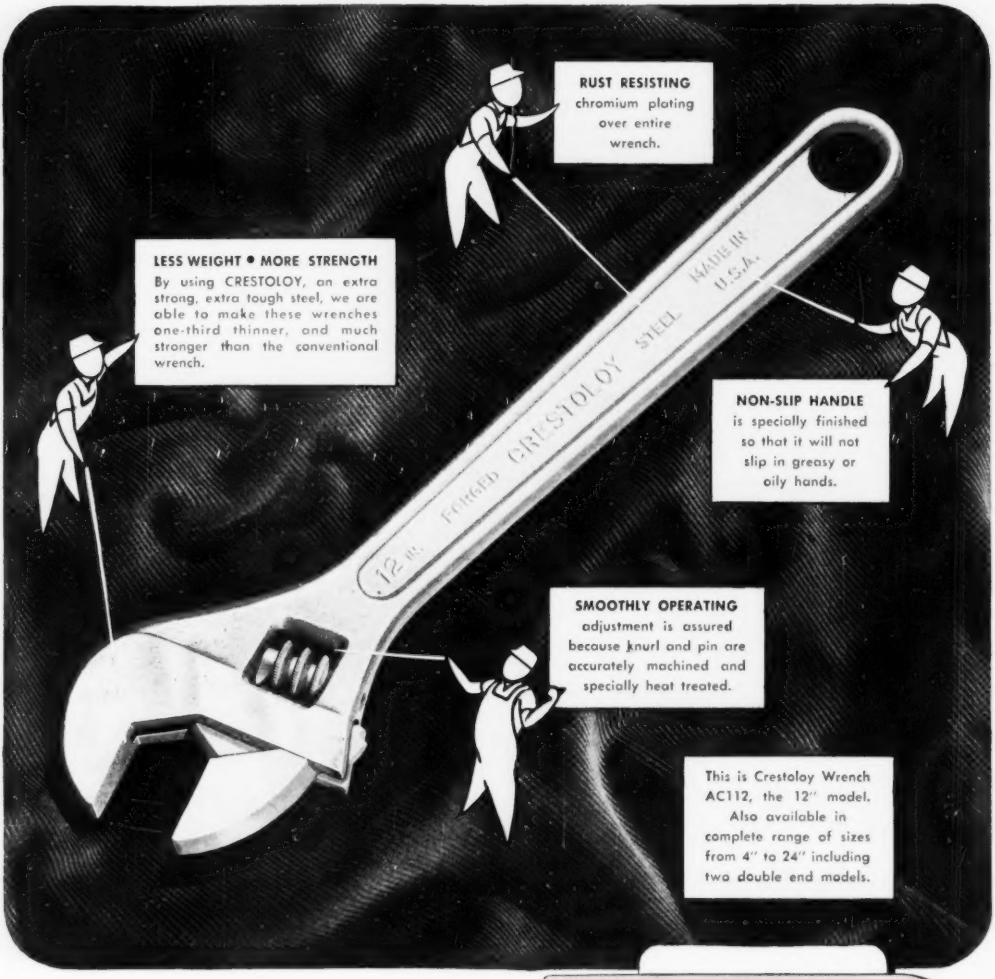
Firm Name .....

Address .....

City ..... *Zone* .... *State* .....

Attention: .....

CRAFTSMEN RECOGNIZE QUALITY *by these fine features in* ADJUSTABLE WRENCHES


RUST RESISTING
chromium plating over entire wrench.
LESS WEIGHT • MORE STRENGTH
By using CRESTOLOY, an extra strong, extra tough steel, we are able to make these wrenches one-third thinner, and much stronger than the conventional wrench.
NON-SLIP HANDLE
is specially finished so that it will not slip in greasy or oily hands.
SMOOTHLY OPERATING
adjustment is assured because knurl and pin are accurately machined and specially heat treated.
This is Crestoloy Wrench AC112, the 12" model. Also available in complete range of sizes from 4" to 24" including two double end models.
12 IN. FORGED CRESTOLOY STEEL MADE IN U.S.A.

EVERYBODY RECOGNIZES QUALITY *by this Trade-mark*

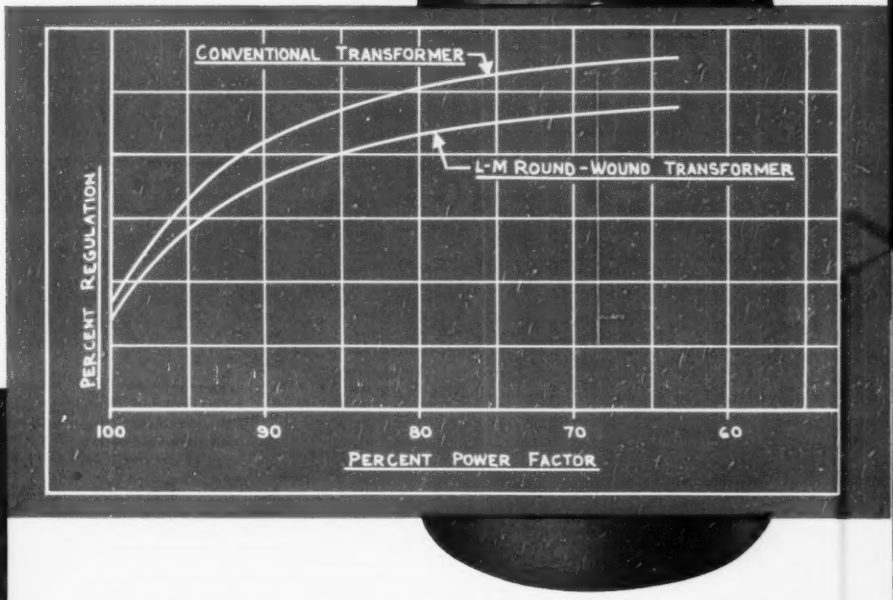
CRESCENT TOOLS

Sign of the Artisan Symbol of Excellence

"Crescent" is our trade-mark, registered in the United States and abroad, for wrenches and other tools. Sold by leading distributors and retailers everywhere and made only by

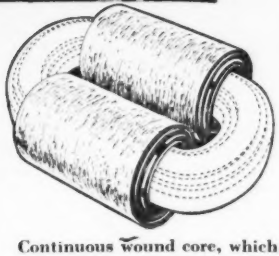
CRESCENT TOOL COMPANY, JAMESTOWN, NEW YORK

"Better regulation at all power factors..."



Robert P. Thompson,
Transformer Design Engineer,
Line Material Company,
Zanesville, Ohio

a major advantage of L-M ROUND-WOUND transformers," says ENGINEER THOMPSON

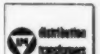


Continuous Wound core, which is never cut, unwound, or disturbed in any way after annealing, because the long round coils are wound directly onto the core by L-M's ingenious Round-Wound method.

"There's no patent on designing good regulation into a transformer," says Mr. Thompson. "The problem is to get good regulation *without* sacrificing other desirable characteristics, *and* without increased cost to the user.

"We are able to solve the problem with our wound core which is not cut, unwound or disturbed in any way after annealing, resulting in uniformly stable core loss and low exciting current. The compact cruciform cross section shape of the Round-Wound core enables the designer to use long round coils with fewer turns and smaller mean turn diameter, thus gaining lower resistance and reactance values. Uniformly low impedance with improved regulation at all power factors—both recognized features of real significance under today's operating conditions—are outstanding features of the Round-Wound transformer."

Want to know more about the savings "Round-Wounds" offer the utility company? Want to know more about how L-M Round-Wound transformers are designed, why they give "Balanced Performance" and operating benefits to the user, better service to the customer? Ask the L-M Field Engineer for this fact-packed bulletin No. 16-G-1, or **write Transformer Division, Line Material Co., Zanesville, Ohio.**



LINE MATERIAL Transformers

Complete Coordinated Equipment For All Distribution Requirements

L-M's new Spherolite, Jr.

for better neighborhood lighting at an economical neighborhood price!

The new Spherolite Jr. offers the many advantages of an enclosed luminaire, with shielded light source and good directional characteristics. Its low original and operating costs make it most suitable for residential areas with narrow streets and wide spacings.

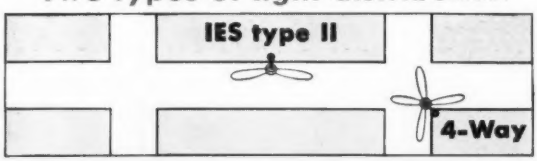
Some Important Features

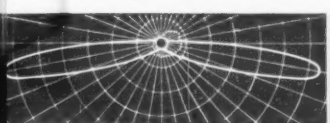
Narrow beam for increased lighting of streets and shielding of residences.

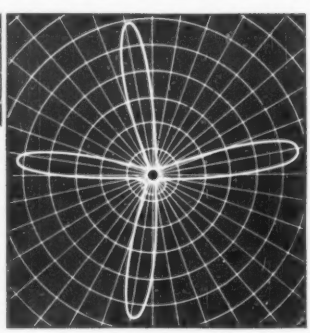
Concentration of light in the main zone, with maximum intensity of eight times the bare lamp value. Main beam at 78° in vertical provides high visibility at wide spacings.

Choice of IES type II or 4-Way light distribution, as shown at left. Refractors easily attached to the specular Alzak reflector with the L-M stainless steel V-Band, which is a positive gasketless seal against bugs, dust, and water. Thus refractors are easily changed in the field, adding flexibility and reducing inventory required for maintenance.

Two types of light distribution







Choice of two Holophane® refractors which provide either the IES type II pattern shown above, or the 4-Way pattern for intersections at right.

Interchangeability to meet traffic or population growth

Spherolite Jr. fits the same wide variety of L-M-standardized heads as do L-M's smallest open reflectors and largest enclosed luminaires. Thus changing luminaires usually means simply unlatching one and latching on the replacement—offering a substantial saving in time and material.

The reflector-refractor assembly illustrated fits any of these: low voltage multiple head; high voltage porcelain head; and, with modified reflector collar, metal series heads up to 5000 volts. The type B head shown is available for either inner or outer wiring, and in either pendent or side mounted style.

Get complete information on Spherolite Jr. and other equipment and L-M Street Lighting Engineering Service ***from the L-M Field Engineer; or write*** **Line Material Co., Milwaukee 1, Wis.**

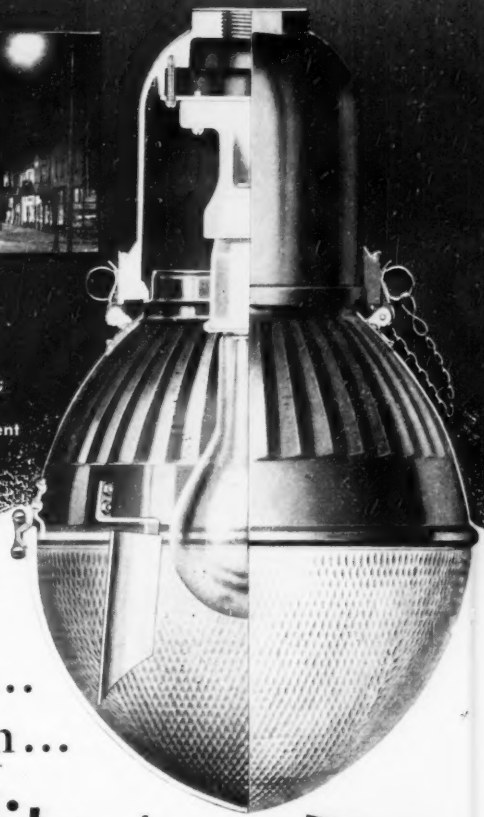
7132

LINE MATERIAL Street Lighting

Complete Coordinated Equipment for All Distribution Requirements

Progressive Towns Re-Light for Safety

These "before" and "after" photos show how one eastern city tripled the illumination with L-M Spherolites. Formerly, light on the pavement was .64 lumens per square foot; with Spherolites it is 1.8—and with the same size and number of lamps. Same total wattage—but more efficient utilization of light. And, says the superintendent, there is less breakage, less cleaning, and maintenance costs are substantially lower. Not bad!



Safety goes up... maintenance goes down... with L-M Spherolite

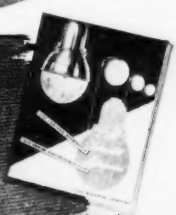
Spherolite luminaires direct a high percentage of the light onto the pavement, spreading the light over a wide area, in a controlled pattern. Here are some Spherolite features:

Versatility: adaptable to all mounting requirements; wide variety of metal hoods, porcelain heads, glassware, holders, deflectors.

Low Maintenance: dust and moisture seals between glass and reflector and hood; easily accessible for relamping. Hoods sealed against dust, moisture insects. L-M fluted reflector by-passes the light around vertical axis of lamp, avoiding heat concentration and assuring full lamp life.

Long life: weather-tight construction maintains reflector efficiency for many years; aluminum and other non-corrosive materials assure long life; heat-barrier hoods prevent cable deterioration.

Engineering Service: need help? ask for an L-M Street Lighting Engineer—trained, experienced men who help you get safe, efficient street lighting to fit your budget.



Want to Know More?

Write for L-M's new Spherolite bulletin. Photometric data, I.E.S. recommendations, and other useful information. Details on Spherolite construction and application, on hoods, glassware, standards, brackets, accessories, and control equipment including L-M "Wired Radio" control. Ask any L-M field engineer or write Line Material Co., Milwaukee 1, Wisconsin.

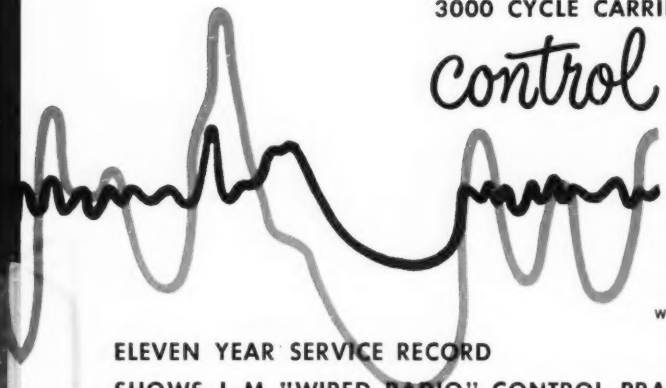
LINE MATERIAL Street Lighting

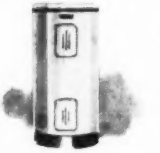
L-M DISTRIBUTION EQUIPMENT INCLUDES: Distribution Transformers • Fuse Cutouts and Fuse Links • Lightning Arresters • Oil Switches • Pole Line Hardware • Line Construction Specialties • Underground Equipment • Fibre Conduit • Street and Airport Lighting Equipment • "Wired Radio" Control Equipment • Capacitors

Cut load peaks... with "wired radio"

3000 CYCLE CARRIER CURRENT control

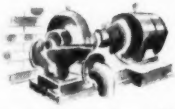
L·M





Street lights, sign and show window lighting

Off-peak water heating



Water supply and irrigation pumps

Airport lighting

Supervisory control, sectionalizing or capacitor switching . . . many other uses

ELEVEN YEAR SERVICE RECORD SHOWS L-M "WIRED RADIO" CONTROL PRACTICAL, ECONOMICAL, TROUBLE-FREE

Just push a button—and "Wired Radio" sends a 3000-cycle carrier current signal over your entire distribution system. Automatic coding selects any one of six types or groups of loads and promptly turns it on or off. No clocks, no pilot wires, no tubes, no trouble, no interference. In fact, it's practically perfect!

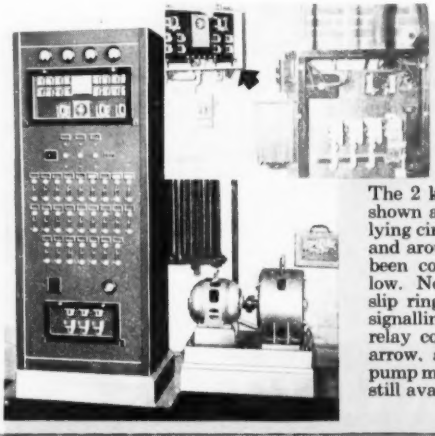
It's a great aid, too, in cutting costs and building revenue. "Wired Radio" cuts both generating and distribution peaks, releasing system capacity for additional loads. It permits greater saturation of water heaters, which can be turned on in any desired group during short or long off-peak periods, or dumped quickly in emergencies. It gives you the full economy of multiple street lighting.

For over 11 years "Wired Radio" installations have been setting records and making money for users. Tests show better than 99.9% correct operation. Many 8-10-year old installations in large and small cities, with minimum maintenance. Pays for itself in 3 to 5 years.

No wonder its recent acceptance by major utilities has been almost phenomenal. Why not ask the L-M Field Engineer to discuss its application to your system? Or write "Wired Radio" Division, Line Material Company, East Stroudsburg, Pa.

New **Simple, Economical Single Group Receiver**

In addition to the standard multiple group receiver, L-M has developed this new single group unit for use on smaller systems and to add an extra group on larger systems.



has used "Wired Radio" to control city water pumps and outlying street lights

The 2 kva 3-group 25-control transmitter shown at left controls street lights in outlying circuits and 16 water pump motors in and around Sioux Falls, S. D. Service has been continuous; maintenance extremely low. No tubes to burn out, no brushes or slip rings, equipment operates only while signalling. Upper photo shows the coded relay control unit (receiver) indicated by arrow, and starter on one of the 50 HP pump motors. Nine positions are still available for future uses.

LINE MATERIAL "Wired Radio"

Complete Coordinated Equipment for All Distribution Requirements

WIRED RADIO CONTROL

LM

7128

Red ink costs

With L-M's 3000-cycle carrier current control you can save *money* by cutting peaks, cutting installation and maintenance costs . . . make *money* with added off-peak loads, higher water heater saturation, and added capacity for future loads.

L·M

"wired radio" control

HELPS YOU STAY IN THE BLACK

L-M "Wired Radio" provides simple, prompt push-button control of any of six different types or groups of loads. There are no pilot wires, no tubes to burn out, no interference; operation is flexible and dependable; maintenance extremely low. It usually pays for itself in 3 to 5 years.

"Wired Radio" controls street and other lighting; water heaters; pumps; supervisory and capacitor switching; signal systems; and other loads, singly or in any desired groups.

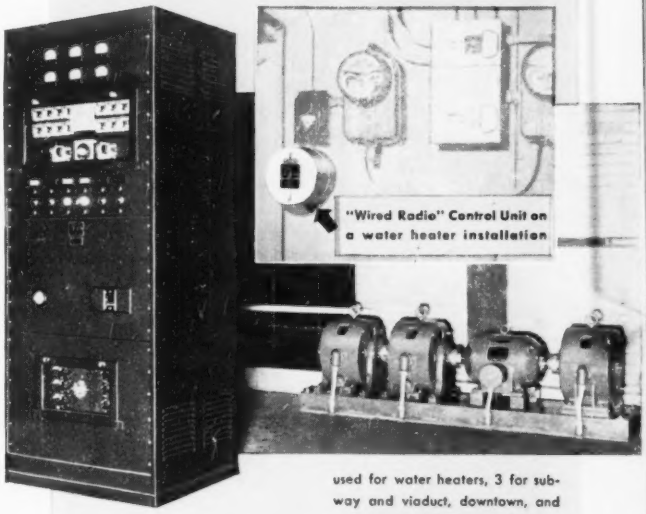
Pushing the button automatically sends a 3000-cycle coded signal over your entire 60-cycle system. This signal selects the desired load group and turns it on, or off. Loads may be added whenever off-peak periods develop, or dumped quickly in an emergency.

Ask the L-M Field Engineer to explain the possibilities of "Wired Radio" on your system . . . or write "Wired Radio" division, Line Material Company, East Stroudsburg, Pennsylvania.

WIRED RADIO CONTROL

For 9 years Ft. Wayne, Ind., has

used L-M "Wired Radio" to control water heaters and street lights. Better than 99.99% perfect operation.



"Wired Radio" Control Unit on a water heater installation

Six kva 6 group transmitter and 3000-cycle generator in the power house at Ft. Wayne, Indiana. Controls about 3500 water heaters and 7000 street lights. Two groups are used for water heaters, 3 for subway and viaduct, downtown, and outlying street lights; the 6th controls decorations during Christmas holidays. The system has made a substantial reduction in peak demand — there has been no interference; maintenance has been low.

7285

LM

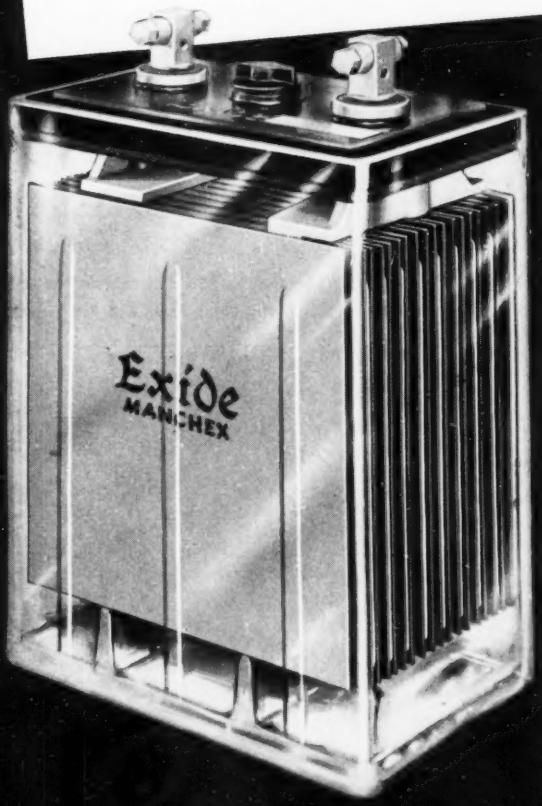
LINE MATERIAL "Wired Radio"

Complete Coordinated Equipment for All Distribution Requirements

THE NEW EXIDE-MANCHEX BATTERY

POWER . . . PERFORMANCE . . . ECONOMY

for Central Station Service



Exide
BATTERIES

An important feature of the new Exide-Manchex Battery is the famous manchester positive plate with its unique lead button construction. The buttons, rolled strips of corrugated lead, are pressed into holes of the lead-antimony grid. Forming action expands the buttons and locks them securely in place. Only a comparatively small portion of the total lead is formed initially into active material . . . the remainder is available for gradual conversion in service.

Negative plates, separators and other elements are designed to match the long life and efficiency of the positive plates. All combine to provide a battery of exceptional power and long-lasting, trouble-free performance.

Use Exide-Manchex Batteries for switchgear and control bus operation, emergency light and power, and other storage battery services. It will provide up to 100% more capacity in the same given space.

1888

DEPENDABLE BATTERIES FOR 61 YEARS

1949

THE ELECTRIC STORAGE BATTERY COMPANY
Philadelphia 42
Exide Batteries of Canada, Limited, Toronto
"Exide" Reg. Trade-mark U. S. Pat. Off.

G-45-30-2-P

What does this FLEUR-O-LIER INDEX SYSTEM NUMBER MEAN?

In a specification, it denotes the exact kind of lighting performance desired. "G" stands for General Diffuse lighting distribution; "45" for 45° side shielding; "30" for 30° end shielding; "2" for a brightness in shielded zone of not more than 2½ footcandles per square inch; "P" means Pendent mounting.

For a fixture, those symbols mean that Electrical Testing Laboratories, Inc., after photometric tests, find it has those performance characteristics.

Thus, it is now possible for the specifier to express simply and precisely the lighting performance he wants. And the buyer can now buy fixtures and know in advance how they will perform when installed. For, in addition to the Index System rating, complete photometric data, together with coefficients of utilization are supplied for each Fleur-O-Lier fixture,

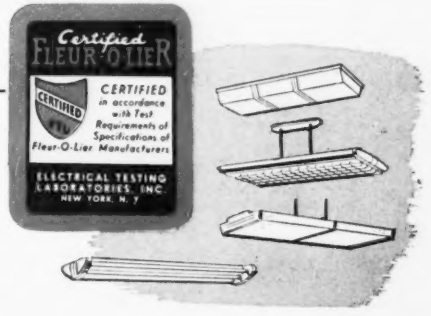
And the Fleur-O-lier label certifies that the fixture is "right" mechanically and electrically.

Fleur-O-Lier Gives *Complete* Information —

All the data needed to make an intelligent choice of fixtures is provided by Fleur-O-Lier. You get—

1. An Index System Rating
2. Photometric test data
3. Coefficients of Utilization
4. Certification

You're *sure* when you insist on Fleur-O-Lier.



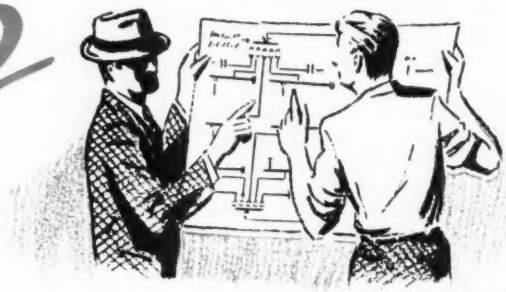
FLEUR·O·LIER

Manufacturers

2116 Keith Building • Cleveland 15, Ohio

Fleur-O-Lier is not the name of an individual manufacturer, but of a group of fixtures made by leading manufacturers. Participation in the Fleur-O-Lier program is open to any manufacturer who complies with Fleur-O-Lier requirements.

3 things POWER CUSTOMERS WANT



1. ADEQUATE SERVICE
2. MAXIMUM CONVENIENCE
3. GREATER ECONOMY

You can better assure all three with . . .

Standard TRADE MARK DRY TYPE TRANSFORMERS

1. ADEQUATE SERVICE

In line with utility companies' policy to assist customers in achieving maximum, efficient use of electric service, Standard dry type transformers are most adaptable. Voltage and capacity ranges permit precise service layouts to accommodate individual situations. Adequate power delivery from substation or load center is achieved. Spotting of dry type transformers for specific equipment can be fitted to the plan. Adequate service, with consistent performance, is assured with STANDARD transformers.

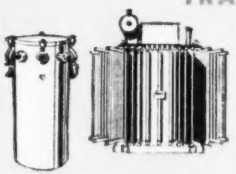
2. MAXIMUM CONVENIENCE

Plant distribution of high or low voltage power from STANDARD transformers with low voltage step-down at vantage points, provides a desirable flexibility. The convenience of being able to relocate equipment and readily move transformers without elaborate rewiring delays is achieved. It provides a system convenience for production flexibility.

3. GREATER ECONOMY

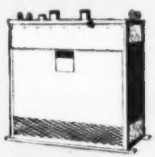
Dry type transformer plant distribution, with load center step-down where convenience is achieved, saves both time and money. With Standard's dry type transformers on the system, less copper, conduit, and fittings are required; costs of vaults or fire walls are eliminated; installation time, maintenance, and labor costs are reduced.

TRANSFORMERS FOR EVERY APPLICATION

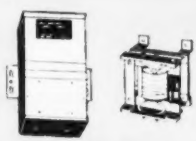


Liquid filled sizes up to 10,000 KVA and 72 KV inc.)

Instrument transformers (for use on circuits up to 72,000 volts, inc.)



Dry type (up to 1000 KVA and max. voltage rating of 4800)

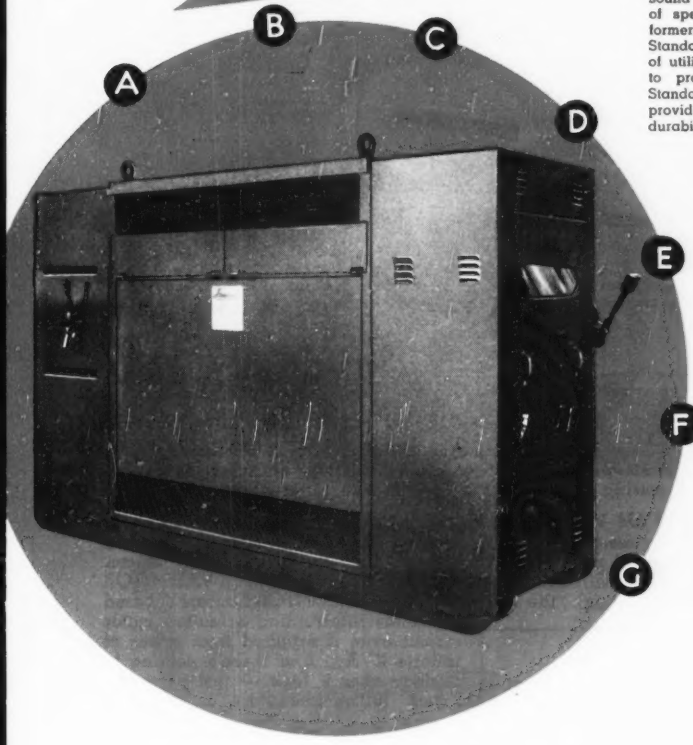


Control transformers (compound filled or open type)

Standard

TRADE MARK ®

The Standard Transformer Company has the sound foundation of more than a quarter century of specialization in designing and building transformers to meet precise requirements of industries. Standard's research in conjunction with the thinking of utility and industrial electrical engineers combine to produce the best possible transformers. The Standard dry type incorporates every feature to provide the present day ultimate in flexibility and durability, with greatest safety.



Type MGT dry type air cooled transformer, rated 1000 KVA, 4160 to 120 208Y volts, three phase, 60 cycle. High voltage load break disconnect switch with power fuses, and low voltage enclosed circuit breaker panel are attached to form compact load center substation.

FEATURES

A. COMPACT

B. FIBERGLAS INSULATION

C. LIGHTER WEIGHT

D. FIRE SAFE

E. HAZARD FREE

F. INSTALLATION EASE

G. ACCESSORY CHOICE

Write for Complete Data and Specifications

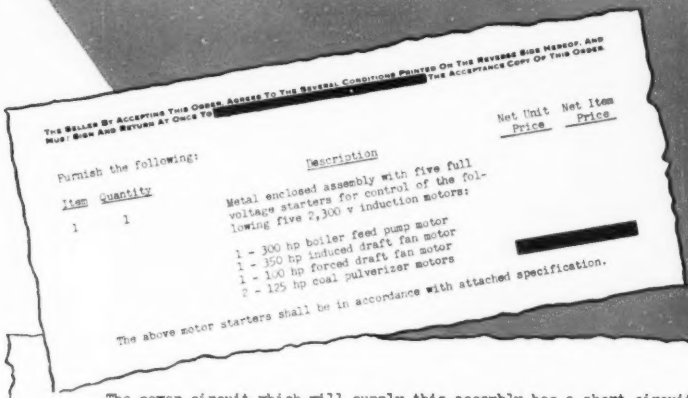
ACCEPTED BY PEOPLE WHO KNOW FROM EXPERIENCE

THE STANDARD TRANSFORMER COMPANY

WARREN, OHIO • OFFICES IN PRINCIPAL CITIES

Large Consulting Engineering Company

Selects EC&M Valimitor Starters



THE SELLER BY ACCEPTING THIS ORDER AGREES TO THE SEVERAL CONDITIONS PRINTED ON THE REVERSE SIDE HEREOF. AND MUST SIGN AND RETURN AT ONCE TO [redacted] THE ACCEPTANCE COPY OF THIS ORDER

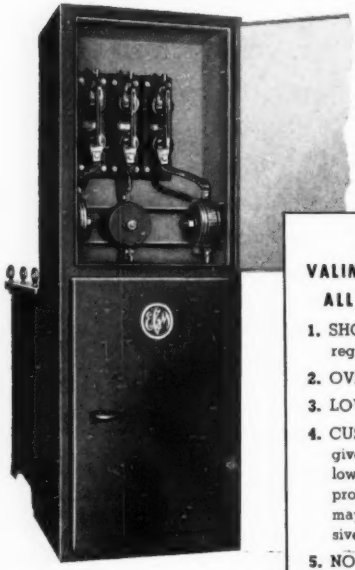
Item	Quantity	Description	Net Unit Price	Net Item Price
1	1	Metal enclosed assembly with five full voltage starters for control of the following five 2,300 v induction motors:		
		1 - 300 hp boiler feed pump motor		
		1 - 350 hp induced draft fan motor		
		1 - 150 hp forced draft fan motor		
		2 - 125 hp coal pulverizer motors	[redacted]	

Furnish the following:

The above motor starters shall be in accordance with attached specification.

For Application Having Short Circuit Capability of 300,000 KVA

The power circuit which will supply this assembly has a short circuit capability of 300,000 kva at 2,300 volts, and the units shall be suitable for operation under these conditions.



Proof of acceptance of EC&M VALIMITOR Motor Starters is shown by the above order issued by the consulting engineering firm handling a new power plant extension.

EC&M VALIMITOR Starters cost about the same as standard starters equipped with auxiliary protective devices having only limited interrupting capacity . . . but the VALIMITOR Starter gives *unlimited* protection. There is *no ceiling* on VALIMITOR protection . . . the design of EC&M VALIMITOR Starters is based on safely interrupting a faulted motor circuit even if supplied from a bus of infinite KVA. And there's nothing to replace after a fault — just press the "start" button to re-start.

Be safe with EC&M VALIMITOR Starters for 2300-4600 volt motor drives. No need to worry about the starter you select today being outmoded by an increase in available KVA tomorrow. To secure *unlimited* protection at one cost, simply send us the name-plate data of your motors. EC&M VALIMITOR Starters give permament, all-time protection.

ONLY EC&M VALIMITOR STARTERS GIVE ALL THESE FEATURES--

1. SHORT CIRCUIT Protection—regardless of available KVA.
2. OVERLOAD Protection.
3. LOW VOLTAGE Protection.
4. CUSHIONED STARTING — gives a smoother start and lower inrush current — improving starting conditions — may save cost of more expensive reduced voltage starter.
5. NO REPLACEMENTS to re-start, after a fault.

MAXIMUM RATINGS

Squirrel-cage, Synchronous or Wound-rotor Motors.

2300 volts		4600 volts
600 HP	60 cycles	600 HP
300 HP	25 cycles	250 HP

For Complete Coverage At All Times... Switch to EC&M Valimitor Motor Starters

THE ELECTRIC CONTROLLER & MFG. CO.

2698 EAST 79TH STREET • CLEVELAND 4, OHIO

HE'S UNDER IT-
HE'S OUT!

ALZAK

LOOK FOR THIS NAME

It identifies aluminum reflectors made extra bright that won't chip, spall, or peel. Clean them regularly and they will last indefinitely. Leading manufacturers make Alzak reflectors in standard shapes and sizes, in specular and diffuse finish.

Fifty-five feet above left field, this baseball's an easy mark for the fielder's eye. This unretouched picture was taken under actual night playing conditions. It proves the exceptional efficiency and lighting control possible with Alzak reflectors of Alcoa Aluminum.

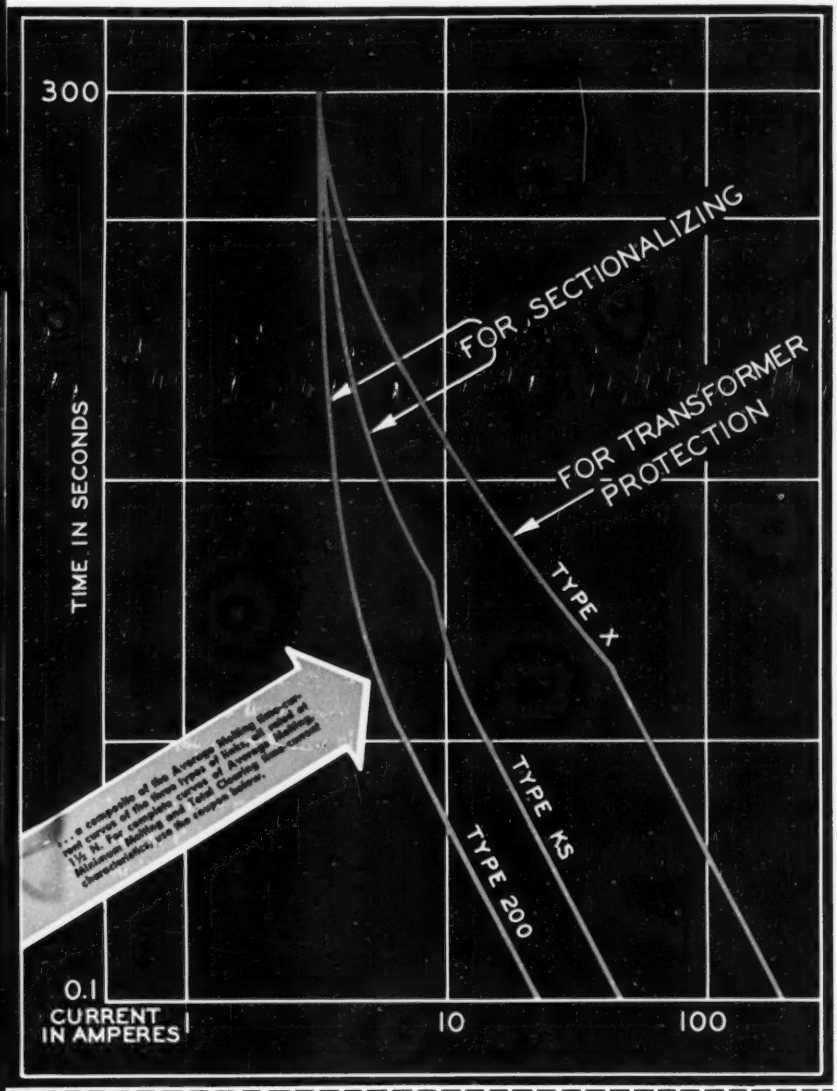
Think of your own lighting. You sink a lot of money into wire, fixtures and current. It's uneconomical to install a poor reflector when Alzak reflectors can give you high lighting efficiency. ALUMINUM COMPANY OF AMERICA, 1978G Gulf Building, Pittsburgh 19, Pennsylvania.

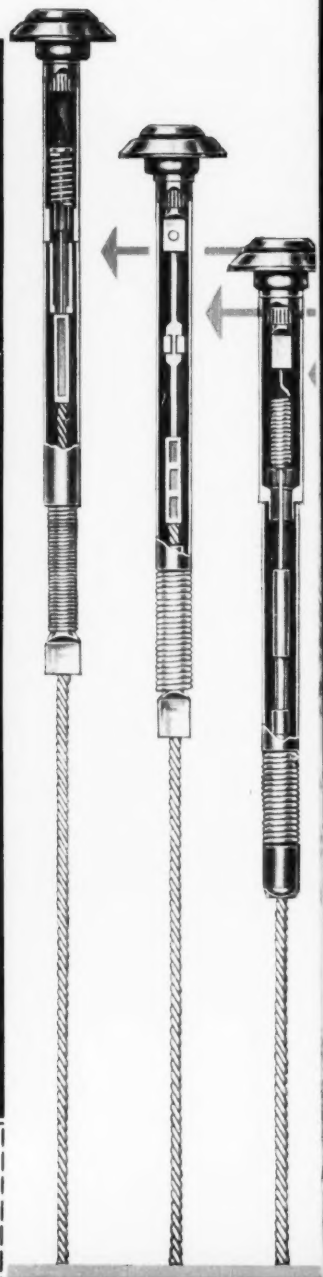
ALZAK REFLECTORS
OF ALCOA ALUMINUM

ALCOA ALUMINUM

made by Leading Lighting manufacturers

3 Speeds for Better


300
TIME IN SECONDS
FOR SECTIONALIZING
FOR TRANSFORMER PROTECTION
TYPE X
TYPE KS
TYPE 200
...a composite of the Average Melting time-current curves of the three types of links. All read at 1½ N. For complete curves of Average Melting, Minimum Melting and Total Clearing Time-current characteristics, use the coupon below.
0.1
CURRENT IN AMPERES
10
100



BETTER

JAMES R. KEARNEY CORPORATION
4236 Clayton Avenue
St. Louis 10, Missouri

13

Gentlemen:

Please send me the complete set of time-current curves on the fuse links checked below:—

- ☐ TYPE 200
- ☐ TYPE K-S
- ☐ TYPE X

Name .....

Company .....

Address .....

Fuse Co-ordination

with KEARNEY FUSE LINKS

FAST — **The Kearney Type 200 Fuse Link Isolates Those Troublesome Circuits, Maintaining Service on Adjacent Lines**

MEDIUM — **Reducing Outages on Circuits Subject to Switching and Minor Lightning Surges is a Job for the Type K-S**

SLOW — **The Type X Link Combines Small Transformer Protection With Slow Surge Response, Providing Maximum Service**

Type 200 . . . Certain circuits prove to be more troublesome than others. When a line is subject to dangerous long-time overloads and surges, continuity of service in adjacent circuits demands fast action in isolating the troublesome line. This fast action protection is made possible by the accurate, durable characteristics of the pure tin used in the Type 200 Fuse Link. The low temperature operation of this link assures that peak loads may be carried without danger of outages. This two-in-one feature of the Type 200 Link makes it a "must" in any efficient fuse-coordination plan.

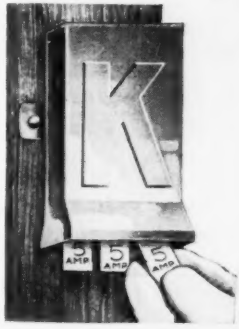
Type K-S . . . Where switching, motor-starting and lightning surges are common, maintain service by using the Type K-S Fuse Link. Low temperature operation accommodates peak loads and dragging overloads with full protection to line equipment and without damage to the cutout. High surge capacity means that the K-S Fuse Link can differentiate between harmless surges and overloads, and those that are damaging. In a thorough coordination plan, fuse links must coordinate not only with other fuses, but also with circuit breakers, and the medium speed characteristic of the K-S Link provides for the proper teamwork.

Type X . . . Designed to match the safe-loading curves of small transformers, the Type X Fuse Link keeps transformers in service during heavy overload periods and surges, and yet fuses in an instant when faults persist or reach dangerous ranges. The slow speed operation means satisfied customers and lowered expense due to unnecessary outages. The high breaking strength of the Type X Link provides security against mechanical failure in applications where apparatus-jarring surges are frequent. Like the other fuses of the Kearney line, the Type X is designed to open at approximately 220% of rated current in five minutes.

An Exclusive Kearney Feature

An added convenience with all three fuses of the Kearney line is the PUL-TAB FUSE-PAK. Individually wrapped fuse links are packaged in groups of five and cartons of 25, combining maximum protection with the handiness of the PUL-TAB. Fuse ratings are indicated on the TAB, assuring positive identification in the field.

Fuse Link Dispenser . . . Keeping the right link at the right place, at the right time, is easy with the Fuse Link Dispenser. Specially designed for mounting on poles at the cutout location, the dispenser will hold one PUL-TAB FUSE-PAK containing five links.



Always Specify JAMES R. KEARNEY CORPORATION ST. LOUIS, MO. *for the Job . . .*

-143

CONSTRUCTION – *SAFER* MAINTENANCE

Conductor Guards*

Twist on...Twist off...by hand

Easily, Quickly and at Low Cost

Here, the lineman is holding the two strips apart for clearer inspection. In actual application, a motion like "wringing a cloth" is used.

CONDUCTOR GUARDS are simply strips of plastic preformed with such a pitch that when twisted together, they form a tight cylindrical sheath. No special tools are needed to install. The conductor need not be disconnected.

In just a matter of seconds, the lineman wraps the preformed strips around the conductor. The result is a uniform, weather-resistant, tight-gripping guard that gives added insulation and protection against abrasion. Conductor life is prolonged indefinitely.

No other method of conductor protection can be installed so quickly or at such a low cost. For complete details, ask any salesman of American Steel and Wire Company, Locke Incorporated or Line Material Company. Or write directly to us.

**Protected under Patent No. 2,275,019*

Where else can you use them?

? APPLICATION

? APPLICATION

? APPLICATION

While PLP Conductor Guards were designed primarily for the protection of conductors passing through trees, we visualize many other applications. Conductors passing over other lines could well use these guards. Lines passing too close to buildings are another use. Tell us your need and let us determine whether or not low-cost PLP Guards are the answer.

PLP COMPANY

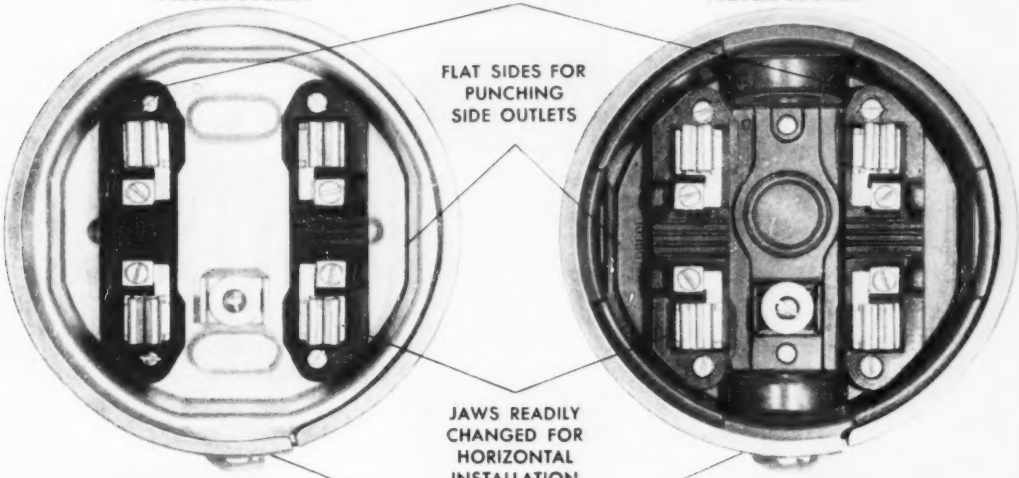
PREFORMED LINE PRODUCTS COMPANY
1051 POWER AVENUE • CLEVELAND 14, OHIO

DUNCAN METER SOCKETS

TYPE D
DRAWN ALUMINUM
METER SOCKET

ROSITE BLOCKS—
HIGH GRADE
ARC-RESISTANT
INSULATION

TYPE C
DIE-CAST ALUMINUM
METER SOCKET



FLAT SIDES FOR
PUNCHING
SIDE OUTLETS

JAWS READILY
CHANGED FOR
HORIZONTAL
INSTALLATION

RAPID CHANGE
ALUMINUM
SEALING RING

TYPE D

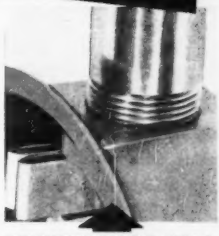
DESIGNED FOR CABLE
. . . BUT MAY BE
USED WITH CONDUIT

For Installation Economy!

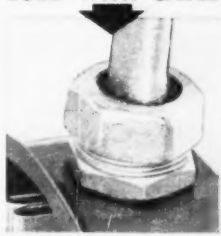
USE the socket designed for the job. Do you use cable—then the Type D provides the best installation at unequalled economy. If you use conduit; the Type C is the answer. Applicable to *most* residential and small commercial services, both Type D and Type C are readily adaptable to either cable or conduit, using standard available fittings; thereby reducing the number of items for stock. Both meet all requirements for standardization and simplification of your present and future socket installation programs. Check the advantages Duncan offers.

makers of watthour meters for nearly fifty years

TYPE C



DESIGNED FOR CON-
DUIT . . . BUT MAY BE
USED WITH CABLE



DUNCAN ELECTRIC MFG. CO. **LAFAYETTE, INDIANA**

will the Public Revolt *against* FLUORESCENT LIGHTING?

Will Sub-Standard Quality and Sub-Standard Performance Bring Fluorescent Lighting into Public Disfavor?

SINCE fluorescent lighting equipment was first made available ten years ago, the standards of fluorescent lighting and of fluorescent lighting equipment have been continuously IMPROVED. As a result, fluorescent lighting has quickly achieved national acceptance. This public confidence has been earned by the Lighting Industry because the great majority of the equipment produced and sold to the public has met with the high standards required to provide satisfactory performance.

TODAY the public confidence is being placed in jeopardy by the increasing occurrence of fluorescent industrial units which, instead of being built up to required standards, are being built down to a price.

How long will it take the public to wake up to unsubstantiated claims?

The public cannot be expected to understand all of the technical factors which differentiate a sub-standard unit from a unit built to deliver sustained trouble-free economical performance.

Informed electrical and lighting men know the importance of high quality starters and lampholders, in terms of easy maintenance, reliable starting and reliable operation.

They know that poor electrical and mechanical design can cause high temperature operations of the ballast resulting in decreased ballast life.

They know, also, that lamp life is shortened by a ballast which supplies low starting current or by one that delivers low operating watts to the lamp. They know that low power factor ballasts do not permit efficient utilization of present wiring. They know that well designed and well constructed lighting units, such as those made to RLM Standards, will stand up and give full satisfaction to the customer.

The Remedy

It is up to the entire Lighting Industry to put this knowledge to work for the benefit of the public. This can best be done by first furnishing customers with the facts about initial cost, maintenance cost and performance of fluorescent lighting equipment and by supplying equipment which is warranted by the manufacturer and certified by an independent testing agency as meeting recognized and published standards of design, construction and performance.

This Advertisement is published in the Interest of the Entire Fluorescent Lighting Industry by

RLM STANDARDS INSTITUTE

The letters RLM stand for Reflector and Lighting Equipment Manufacturers

326 WEST MADISON STREET • SUITE 821
CHICAGO 6, ILLINOIS

R-3363

Your Central Conduit Distributor will do everything possible to meet your wants

CENTRAL SPANS CONDUIT

● Your Central Conduit Distributor has a modern efficient operation. But he hangs on to one old fashioned precept . . . *the customer is king.* He is always ready to go-the-limit when it comes to service.

If you need a few lengths or a carload of Central Rigid Steel Conduit, you'll find that he's ready to give you the kind of service that helps your jobs sail along smoothly.

Next time you need conduit or other electrical supplies, contact your Central Rigid Steel Conduit Distributor first. He's a dependable source of supply and will do everything possible to supply *everything* you want—*when* you want it.

CENLACO a hot dipped galvanized and lacquered finish, inside and out.

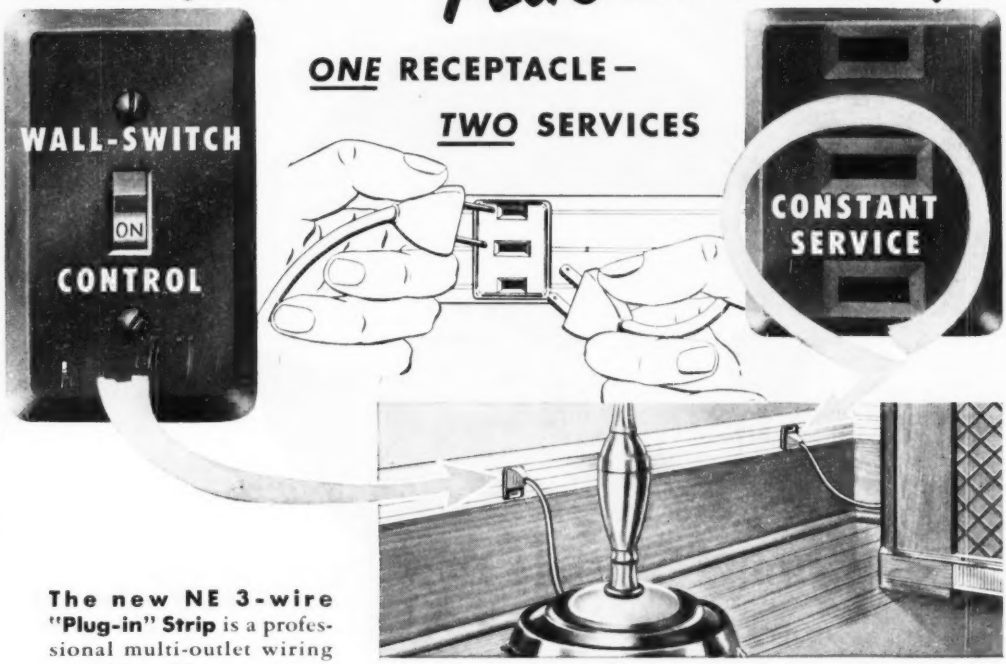
CENTRAL WHITE electro-galvanized outside and black enameled inside.

CENTRAL BLACK permanent, baked-on black enamel finish, inside and out.

SPANG-CHALFANT

Division of The National Supply Company
General Sales Office: Grant Bldg., Pittsburgh, Pa.
District Offices and Sales Representatives in Principal Cities

NOW- a switch controlled "PLUG-IN" STRIP!



The new NE 3-wire "Plug-in" Strip is a professional multi-outlet wiring assembly with an unusual new feature: Instead of the usual two slots, each receptacle has three.

Appliances plugged into the top and center slots are controlled by doorway switches, while appliances plugged into center and bottom slots will operate independently of the wall switches. Thus, you can turn off all lamps at once, but leave the electric clock, radio, and other appliances running.

- **EASY TO INSTALL.** At last, full switch-controlled service of *every* outlet with minimum switch-leg wiring. No complicated behind-the-wall installations.
- **ARCHITECTURALLY CORRECT.** An unnoticeable steel baseboard trim.
- **SAFE FOR LIFE.** No soldered or screwed connections . . . a solid copper electrical system from switch box to the very last outlet. Tamper-proof because the capping is locked on permanently.
- **LISTED BY UNDERWRITERS' LABORATORIES, INC.**

Let us send you a copy of our booklet "The *New* Switch-controlled 'Plug-in' Strip," and the pamphlet "An Adequate Wiring Plan for Residential Wiring Modernization."

NATIONAL ELECTRIC PRODUCTS NE WIRING SYSTEMS WIRES AND CABLES

National Electric Products Corporation

1305 CHAMBER OF COMMERCE BUILDING · PITTSBURGH 19, PA.

Power for New England

ROBERT NATHAN made the interesting statement in his recent economic report for the CIO that wages should go up to increase the purchasing power of labor. His reasoning was based upon the fact that industry could more easily be forced to raise wages than to reduce prices. He assumed, of course, that profits could be squeezed to the extent necessary to permit this wage increase.

This report illustrates the kind of thinking becoming all too prevalent, the kind that must be stopped by positive action.

A fallacy which haunts our industry is the claim that power costs materially affect the location of industry. Specifically we refer to the claims of certain top government officials that the high cost of power is causing industry to leave New England.

So far there seems to be no valid proof of these claims but that makes no difference. They still provide an excuse, though a very flimsy one, for more public power.

A study by Chas. T. Main, Inc. shows what most utility people knew anyway, that power amounts to no more than from 1% to possibly 3% of the total value of textiles manufactured in New England. If such power were purchased in the South, it might be less. But who can afford to build a new factory and move the equipment to save a maximum of perhaps 1% in production cost.

Now the Federal Power Commission comes forward with a report to Senator Saltonstall to show that lots of cheap power can be produced. They presented figures showing a potential capacity of 3,119,000 kw to produce 10.6 billion kwhr annually representing a 39% capacity factor. Such a substantial use of hydro capacity is of itself unusual. Further, the 3,000,000 kw is to be compared with 500,000 kw reported by the New England Council as feasible.

So here again we find a wide divergence in analysis of a practical engineering and economic problem. Even if power costs don't run industry out of New England, people may keep thinking it does. Even if 3,000,000 kw cannot be economically installed in New England, no less an authority than the Federal Power Commission says it can.

The problem for New England is to get wise to itself. Either bring down the price and develop the hydroelectric power that FPC says it can or show in a simple way that this is not feasible.

A comprehensive study must be made in addition to the valiant report of the New England Council, and the apparently substantial contribution of the FPC. Neither report is in the simple language required for presentation to the public. As the Boston Herald so aptly stated, "Ordinary New Englanders have a right to unvarnished facts" about power for New England.

Experts for Buyers

WHAT BACKGROUND should a purchasing agent have to achieve maximum results in a period when smart buying can make the difference between high and low operating costs? Several companies have recently followed the practice of transferring engineers to the purchasing assignment. Others have established a much closer functioning arrangement between the purchasing section and the engineers who design and operate. In brief, the purchasing official can have close behind him his own engineering experience or the current experience of the engineering groups of the company. Either way is working out to give assurance that the power business will mechanize its operations just as far as economics warrants.

One most significant factor in having engineering thinking motivate the buying is in connection with the stimulation of new devices. Many manufacturers of mechanical equipment whose markets are outside the electric utility field seem not to sense the volume of that market nor to realize that it offers opportunity to cultivate special adaptations for it. That is where an engineer-minded or engineer-coached purchasing agent can educate the equipment manufacturer to just such potentialities.

There is hardly a better example than that of the task of clearing right-of-way and keeping it cleared. Every conceivable device from scythes, handsaws, and brushhooks to bulldozers, dynamite, chemicals, and unmerciful beaters of saplings, brush, and roots is being used. The buyers and the engineers are taking what they can get, but they would prefer to see a definitively designed array of facilities aimed specifically at that task. Team work between purchasing agents and utility engineers and equipment manufacturers' engineers should result in a programmed but simple line of equipment for right-of-way clearing.

Just such collaboration has resulted in concrete saws and broaches, pneumatic fish-lines, tree fellers, mechanical splicers, etc. More of the same is needed, and it will be created and applied more quickly if collaboration between utility purchasing agents and utility engineers is elbow to elbow.

This Clothes Dryer, Now—

ONE ELECTRIC clothes dryer has a demand of 4.5 kw. What is the diversified demand of 2 or 3 or 10 or 50 or 100? Nobody knows. Or if anybody does he has not communicated his knowledge to ELECTRICAL WORLD. So, for the purpose of this editorial, we state flatly that nobody knows what demand the clothes dryer load will make on the distribution system.

As for the single appliance, we do know from—rather, we are informed by—a paper presented by Paul R. Bishop, Jr. of the Portland General Electric Co. to the Northwest Electric Light and Power Association, that its load factor is shockingly low, less than 2%. But it will use maybe 500 kwhr per year and that, at any rate you want to figure it, represents important revenue.

Moreover, it can be taken for granted that no customer will have a clothes dryer without having also an automatic washer, an ironer, and an electric water heater. In fact, the dryer will be the final appliance rounding out the electric home laundry. The dryer, then, should not be judged as a load by itself alone and condemned on its miserable load factor and high demand. It should be considered as part of a group which, obviously, will have much better load characteristics than any of its components. Again reaching into Mr Bishop's paper for data, we find that the home laundry will use up to 1,400 kwhr per year, which represents a revenue not to be sneezed at.

The national average residential bill in 1948 was $47.05. Capitalized at 15%, this means an average investment of $314 per customer. Say the electric laundry energy usage will be at 1.5¢ per kwhr. The revenue then is $21. At 15% capitalization, the additional investment to serve the laundry load can be $140 per customer. You can do a lot of distribution system strengthening with that kind of money.

Any reasonably intelligent utility man can punch large jagged holes in such figuring as this. But let him tear our calculations into shreds and tatters. He will still be confronted with an inescapable condition. It is that the home laundry is an integral part of electrical living, which he must promote if he wants to stay in business.

Practice for the Second Team

AMONG the second and third string men in the electric power industry there is a great reservoir of progressive leaders. Few will have the opportunity to carry the responsibilities of which they are capable.

These men are trained adequately in solving utility problems either in the field of engineering, accounting, or selling. They are men who have proved their value beyond a reasonable doubt. But because of personnel situations in their own companies, they will never have the opportunity to reach the top.

The broad experience of one man who is blocked by a young department head may equip him for a similar top departmental position in another company.

Perhaps one of the most important reasons for this stymying of experienced men is the lack of facilities for transfer to other utility companies who need their talents. Such a plan would not mean a change from the idea of bringing department heads up from the ranks. The same men would get to top positions but perhaps in some other company. There would be more jobs for the deserving, not fewer. There would be more opportunity for everyone.

The free movement of industry personnel between operating units should not be overlooked as plans are made to maintain and improve the calibre of the top executives now running the industry.

The Electrical Week

New England is still seeking the answer to the question: How much undeveloped hydroelectric capacity is available in the area? Some months ago the New England Council claimed 500,000 kw. Now the Federal Power Commission says over 3 million kw. But there were fundamental differences in FPC's approach . . . Electric utilities in all sections of the country have started to give the fourth round of wage increases. The pattern has been 5 to 10c an hour or 5 to 10% . . . The increase in output over last year is slowly diminishing. Last week it was only 2.2% over the corresponding week a year ago. It was the smallest increase since week ended Aug 11, 1946, almost three years ago.

Much harder than selling an electrical appliance is acting out this selling job for a television commercial. One utility ad manager says he hasn't seen one good live commercial, claims film commercials are much better.

Presidential advisor Clark Clifford reportedly is the chief Administration supporter of Leland Olds' nomination for another term on the Federal Power Commission. Clifford allegedly was swayed by Olds' friendly relations with railroad labor, public power, and left-wing Democrats.

A problem faced by gas utilities when converting from manufactured to natural gas is that of amortizing the abandoned gas-making facilities.

Soot blowers, the large size of power plant boilers, the perfection and many uses of American welding, and the high grade of coal used by utilities in this country won the admiration of a French thermal power plant executive who toured the United States with an ECA-sponsored group.

"A dishwasher in every kitchen" will be the campaign slogan of Mrs. Hannah Durham, recently endorsed by a GOP women's group as candidate for governor of Pennsylvania. Every kitchen already has a dishwasher, of course, but Mrs. Durham means an electrical, not a human one.

Idaho Power Co has an annual market of about 40 million kwhr for pumping water.

President Truman has endorsed legislation amending the Natural Gas Act to give Federal Power Commission jurisdiction over natural gas pipe line security issues. Representative Crosser, Ohio Democrat, introduced the measure, which stands a fair chance of passing the House this year. Also interested are Halsey, Stuart & Co, Otis & Co, and other investment houses, which hope for enforced competitive bidding on utility issues.

Many companies, even where capacity is tight, are beginning load stimulation activities through vigorous campaigns on "off-peak" appliances.

The air lift to feed blockaded Berlin would never have been necessary if the U. S. had sent some electric utility right-of-way negotiators to deal with the Russians. A man who can get an easement from a stubborn farmer terrified by the dangers from a transmission line crossing his property can get a right-of-way anywhere.

As of Mar 31, REA borrowers were operating 789,000 miles of line and serving 2,626,000 consumers. Approximately 77% of these are farms.

The American Power Dispatchers Association now has as members 257 dispatchers, representing 38 utilities operating in 20 states.

Of the 38 million homes in the United States that are wired for electricity, 27 million have electric refrigerators, 24 million have electric washing machines.

Anyone out of work may get some comfort from the fact that there are some 22,000 different jobs in the American economy. For proof consult the Dictionary of Occupational Titles sold by the Superintendent of Documents, Washington 25, D. C., for $5.50.

Notes From The News

A fire on the WOR television tower at North Bergen, N. J., (EW, June 25, p 13) caused considerable damage. A tarpaulin on a platform 750 ft above ground caught fire, and blazing sections of it fell on roofs of houses below, igniting seven of them . . . Three conclusions have been drawn by the U. S. Bureau of Mines and Alabama Power Co from their Gorgas, Ala., attempts to produce a commercial gas by burning underground beds of coal: 1. A sensible heat gas can be made; 2. Combustion can be maintained; 3. No limit on the amount of coal that can be burned has been reached . . . Lancaster, N. B.'s parish council has threatened to tax all properties of the St. John, N. B., Power Commission, owned by the city of St. John, within the parish. The tax would be in

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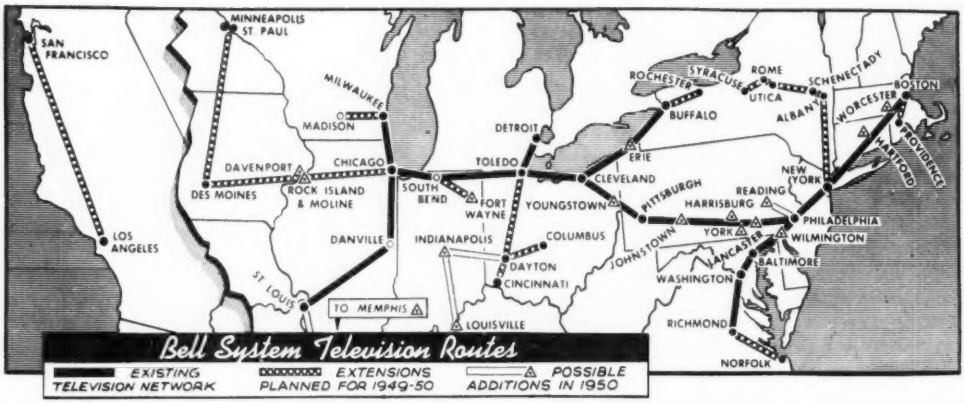

retaliation for the Commission's refusal to allow the parish a share of operating profits . . . Mississippi Power & Light Co's net income went up 130% in June, 1949, from $58,094 in June, 1948, to $133,856 this year.

The 10% temporary cut in Consolidated Edison Co rates ordered by the New York Public Service Commission will be in effect at least until October. The Court of Appeals has granted the PSC a stay of an Appellate Division ruling nullifying the reduction . . . Two New York and Baltimore television stations will make experimental broadcasts in color this summer. Federal Communications Commission permits have been issued to WCBS-TV, Columbia Broadcasting Co's New York City outlet, and WMAR-TV, operated by the Baltimore Sunpapers . . . The first experimental gas turbine gas line pump unit has been temporarily installed at Wilmar, Ark., to test its feasibility in transportation of natural gas. A 2,000-hp turbine is being used . . . Construction of a 50-million-v proton linear accelerator which will be the world's most powerful atom smasher of its type will be started at the University of Minnesota this year under a $728,000 grant from the Atomic Energy Commission.

West Penn Power Co plans to recognize its 300,000th customer by presenting him with a deluxe-model electric range of his own choosing. The utility was serving 299,155 customers at the end of June and expects to hit the 300,000 mark in July or early August . . . A Mississippi Society of Professional Engineers-approved bill revising the state's present engineering license law will be presented to the Legislature next January. The measure would change the experience required for an engineer's license from one year to three, bringing Mississippi in line with other states . . . Central New York Power Corp's Browns Bridge Power Plant was shut down when the 12-ft-dia pipeline leading from the gate house at Colton, N. Y., caved in for a distance of approximately 100 ft . . . Eight northeastern Oklahoma cities have joined forces to protest a proposed 15% increase in power rates by Grand River Dam Authority.

A suit has been filed attempting to bar the City of Paducah, Ky., from conducting a vote in November on purchase of local Kentucky Utilities Co properties. The action attacks the validity of a city ordinance calling for an election on issuance of revenue bonds to buy the utility's system and convert it to municipal operation. Power would be purchased from Tennessee Valley Authority . . . Two condemnation suits to obtain possession of 8,546 acres of land in the Buggs Island area of Mecklenburg County have been filed by the United States. The land is sought for the Buggs Island Dam project . . . Stockholders of American Light & Traction Co have voted to change the company's name to American Natural Gas Co . . . FPC has ordered Kentucky West Virginia Gas Co to reduce its rates for natural gas to Louisville Gas & Electric Co by $105,601, effective Nov 1.

Manufacturers & Markets:

Industrial production dropped in June for the seventh consecutive month, reaching a three-year low, the Federal Reserve Board reported. Many economists think July output will be even lower because of the vacation season . . . Zinc and lead are still going up. Zinc has been boosted ½c to 10c a lb, East St. Louis. Lead has been boosted ½c to 14½c a lb, New York . . . General Electric reports it has 1,134 more stockholders than a year ago. The 1949 count is 250,591 . . . Westinghouse Electric Corp has formally rejected the United Electrical Workers' demands for a wage increase, pensions, and other benefits . . . The Deepfreeze Division of Motor Products Corp will add a second shift of about 200 men to its production lines Aug 1 . . . Kelvinator Division of Nash-Kelvinator Corp has added 350 employes to its final assembly line at Grand Rapids . . . Reynolds Metals Co shipped its five millionth lb of ACSR on June 30.

FPC Finds More New England Hydro

Claims 3,119,000 Kw Available at Undeveloped Sites; New England Council Has Set Total at 500,000 Kw; 2 Groups Differ Fundamentally in Approach

EXPERTS frequently differ in opinion; but when two groups of experts are 2.5 million kw apart on the undeveloped hydro capacity of one of the most important areas in the United States, the electric utility industry needs some clarification.

The area is New England. The experts are Chas. T. Main, Inc. of Boston and the Federal Power Commission. The former places New England's undeveloped hydroelectric potential at 500,000 kw. The latter has gone on record for more than 3 million.

NEC Says 500,000 Kw

Last year the New England Council, a non-profit organization of industrialists, educators, and numerous others interested in the economic and recreational facilities of the region, aroused by charges that industries were being driven out of New England by high power costs and indirectly by the failure of private utilities to develop "cheap" hydro power, hired Chas. T. Main, Inc. to make a survey of hydro power sources. It was the report of this private firm of engineering consultants that "refuted" the charges and established the 500,000 kw figure.

The problem became controversial after publication of the report (EW, Jan 29, p 91) when Massachusetts' senior senator, Leverett Saltonstall, sent the report to FPC and asked for comments. FPC's reply brought out the 3 million plus kw estimate.

Approaches Differ

But, as FPC admitted, there were "fundamental differences in the approach" of the two studies. Its report to the Senator lists them:

"1. The NEC estimate appears to have been determined principally as the summation of the potential development at individual projects considered independently, rather than an approach which looks upon the entire river as the unit of development.

"2. The NEC estimate is based solely on consideration of projects for the single purpose of power development, whereas Commission staff estimates are based upon multiple-purpose development wherever possible.

"3. The NEC estimate includes those projects that would be economically feasible with annual charges against the cost of the project of 8 to 10%—about twice the annual charges that would be incurred under federal financing."

New England Hydro
FPC Opposes NEC

River Basin	NEC Undeveloped Potential (kw)	FPC Undeveloped Potential (kw)
Penobscot	134,000	435,000
Kennebec	92,000	521,000
Saco	16,000	98,000
Androscoggin	35,000	381,000
Merrimac	5,000	256,000
Connecticut	69,000	749,000
Housatonic	31,000	62,000
Winooski	18,000	59,000
Lamoille	7,000	19,000
Missisquoi		14,000
Otter Creek		34,000
Poultney		3,000
All others	13,000	
(Sub Total	420,000	2,651,000)
St. John		258,000
St. Croix		10,000
Passamaquoddy		220,900
(Sub Total		488,000)
Army Engineers Projects		
Merrimac	36,000	
Connecticut	42,000	
(Sub Total	80,000	)
Grand Total	500,000	3,119,000

State	Undeveloped Potential (kw)	Undeveloped Potential (kw)
Maine	263,000	1,807,000
New Hampshire	121,000	566,000
Vermont	35,000	476,000
Massachusetts	18,000	160,000
Connecticut	63,000	110,000
Total	500,000	3,119,000

These "fundamental differences" enabled FPC to place New England's undeveloped potential at 3,119,000 kw.

FPC explained the discrepancy in part. It included in its total three international projects for 488,000 kw. One, Passamaquoddy, is down for 220,000 kw. Public financing at about half the cost of private financing made another 1 million kw economically feasible. The controversy actually centers about the amount of power available at sites both groups agree should be developed and on whether the taxpayers' money should be used to finance power projects.

When asked to comment on the 500,000-kw discrepancy between his company's figures and those of FPC for the 37 sites both groups agree on, W. F. Uhl, president of Chas. T. Main, Inc. asserted:

"There is no physical obstacle that we know of to prevent the installation of 1 million kw, or, for that matter, of 1.5 million kw or more capacity, in these projects. But very definite questions of economic feasibility arise in consideration of these larger capacities. The additional 500,000 kw proposed by FPC for these 37 projects is purely marginal capacity. Marginal power output from hydroelectric plants may well cost more than the fuel costs at steam plants, and where this is so the overdevelopment of water resources will most certainly increase the cost of power rather than reduce it."

In its report FPC makes much of multi-purpose projects which would include flood control, navigation, improvement of water supplies, pollution abatement, and recreation as well as power. But the New England Council has other ideas. In its report it said:

Hits Dual-Purpose Dams

"The main river valleys in New England are too thickly settled and industrialized to make dual-purpose projects practicable. River valley authorities similar to the Tennessee Valley Authority are, therefore, not justified for New England rivers, or even practicable, without destroying values far in excess of possible values added by increased development."

On government power projects Uhl made this comment:

"It is apparent that if the government uses much of our money to finance these (multi-purpose) projects, less money will be available for private financing and that will make the cost of private financing greater. If the government pays no taxes, on either property or income, the taxes must be made up by the people, who are the government, in other ways.

Public Power Cost Higher

"If, as experience indicates, projects built by the government cost more than those privately built, the financing must be for a greater capital expenditure, and the difference in annual cost between government and private financing can easily be lost. A change in bookkeeping will not convert economically unsound undertaking into a sound one."

The NEC-FPC differences extend to how much capacity New England will need in the future, by 1957 to be exact. NEC says 1.1 million kw, FPC 2,135,000 kw. Some 694,000 kw of the difference FPC explains. It places peak load in 1957 at 4,330,000 kw, 330,000 kw higher

than NEC estimates. It assumes that thermal plants 40 years of age and over will be retired. This 300,000 kw of retired capacity is not in the NEC figures. FPC also places needed reserves at 630,000 kw, 64,000 kw higher than NEC.

But there is not complete disagreement between the two groups. Both agree that hydro is no solution to New England's power problems and that much steam capacity is needed to provide primary power as well as to firm up hydro capacity.

Both agree also that most of New England's undeveloped hydro capacity is in Maine, where, because of the Fernald law, it will benefit no one but residents of that state.

But when one considers that for the four remaining New England states (Rhode Island has no capability) FPC claims 1,312,000 kw and NEC 157,000 kw, there is still a wide difference in the two reports to reconcile.

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New Co-op Buys Division from Inland Utilities Co

The New Mexico Public Service Commission has approved the sale of the Grants district of the Inland Utilities Co to the recently formed Continental Divide Electric Cooperative Co. The price was given as $715,000.

The Grants division served the town of Grants (west-central New Mexico) and the unincorporated communities of Acoma, Acomita, Cubero, Laguna, McCarty's, New Laguna, Paraje, Philadelphia, Prewitt, San Fidel, San Rafael, and Seama.

The purchase included all other transmission and distribution lines in McKinley and Valencia Counties, plus the generating plant at Grants.

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Purchase by City Urged

Purchase of Ottawa Light, Heat & Power Co's Ontario electric business by the city of Ottawa has been recommended by Ontario Hydro-Electric Commission. The Commission suggested a price of $7.6 million. The company would retain its gas service, its business in Hull, Que., and its net current assets.

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To Buy Wadhams Lines

New York Power & Light Corp has received Public Service Commission authorization to purchase the distribution system of the Wadhams & Westport Power & Light Corp, which distributes power to the village and town of Westport and an extensive rural area. The decision was based on Commissioner Spencer B. Eddy's opinion that New York P&L will give better service and will reduce rates by about $11,600 annually to Wadham's 550 customers. Wadhams' two hydro generating stations are not included in the sale.

Changes in Capacity Reported to Federal Power Commission

PLANT ADDITIONS IN MAY

Utility	Plant	Fuel	Capacity (Kw)
Niagara Falls (N. Y.) Power Co	Schoellkopf	H	8,000
Eastern New York Power Co	High Falls	H	4,000
Dayton (Ohio) Power & Light Co	O. H. Hutchings	S	60,000
Dahlberg Light & Power Co	Gordon, Wis.	IC	700
Hawley Light & Power Co	Hawley, Minn.	IC	300
Rural Cooperative Power Association, Maple Lake, Minn.	Pine City	IC	1,000
Syracuse Electric Light System	Syracuse, Neb.	IC	460
Central Kansas Power Co	Hays	S	6,000
Hill City Water & Light Plant	Hill City, Kan.	IC	520
McPherson Water & Electric Department	McPherson, Kan.	IC	1,900
Kansas Power & Light Co	Tecumseh	S	30,000
Virginia Electric & Power Co	Kitty Hawk, N. C.	IC	600
Tennessee Valley Authority	Douglas Dam	H	26,000
Minden Light & Water Department	Minden, La.	IC	1,150
Central Louisiana Electric Co	Colfax	IC	116
Central Louisiana Electric Co	Plant No. 13	IC	80
Central Louisiana Electric Co	Chaneyville	IC	48
Central Louisiana Electric Co	Lecompte	IC	60
Central Louisiana Electric Co	Villa Platte	IC	185
Central Power & Light Co	San Benito, Tex.	S	20,000
Texas Electric Service Co	Permian Basin	S	12,500
Texas Electric Service Co	Wichita Falls	S	12,500
Dallas (Tex.) Power & Light Co	Mount Creek	S	60,000
Montana Power Co	Kerr	H	56,000
El Paso (Tex.) Electric Co	Rio Grande	S	20,000

PLANT RETIREMENTS IN MAY

Greenville Electric Light Co	Greenville, N. H.	IC	150
Greenville Electric Light Co	Greenville, N. H.	S	180
Minnesota Power & Light Co	Park Rapids	H	96
Rural Cooperative Power Association	Cambridge, Minn.	IC	1,000
Indianola Municipal Utilities	Indianola, Ia.	IC	240
Syracuse Electric Light System	Syracuse, Neb.	IC	168
Central Kansas Power Co	Hays	S	500
U. S. Navy Engineers	New River, N. C.	IC	1,300
Eugene Water Board	Waterville, Ore.	H	2,628

H—Hydro, IC—Internal Combustion, S—Steam.
United States Capacity as of June 1, 1949—Steam, 40,662,814 kw; Internal Combustion, 1,567,848 kw; Hydro, 15,871,221 kw; Total, 58,201,883 kw.

Former Co-op Head Held on Embezzlement Charge

The former manager of a federally financed electric cooperative is being held in Virginia on charges of embezzling co-op funds.

Rural Electrification Administration representatives have been examining records of the Prince William Electric Cooperative at Manassas, Va., for several months. They reportedly have found a shortage of about $19,600 in cash. Inventory of equipment and other materials is still under way.

John M. Roseberry, 35, manager of the co-op since 1941 and an employee since 1933, was held under $7,500 bond on several charges of embezzlement. He was replaced as manager when the investigation began.

Roseberry is alleged to have juggled the power supply account with an Army installation served by the cooperative.

Congress to Authorize Federal Science Program

After four years of trying, Congress is finally going to set up a National Science Foundation to promote research in universities and laboratories.

The Priest Bill, approved recently by the House Interstate Commerce Committee, meets the objections President Truman had against legislation he vetoed two years ago. And Representative Priest, of Tennessee, is pretty sure he can get the green light to put the law through the House before summer adjournment. The Senate already has voted a similar bill. The plan is to get the program started this fall.

The proposal puts the federal government into the businesse of developing such sciences as mathematical, engineering, physical, medical, and biological. Cost will be roughly $15 million in the first year, stepping up to $25 million a year later.

In brief, the science foundation will do the following:

1. Maintain a register of scientific and technical personnel and provide a clearing house for information covering scientific and technical personnel.

2. Award scholarships and graduate fellowships to students for basic research. The awards will total roughly $2.5 million the first year.

W. H. SAMMIS, president of Pennsylvania Power Co, takes the controls of the power shovel to break ground for an addition to the company's New Castle Plant. Standing on the tracks is L. B. Round, vice-president and general manager. The new addition will have an 85,000-kw unit. By coincidence the occasion was the tenth anniversary of the dedication of the original 70,000-kw plant, in which the late Wendell L. Willkie took part

Recent Wage Agreements in Utilities Set Pattern of 5-10¢, 5-10% Boost

RECENT WAGE increases granted by electric utility companies range from 5 to 10¢ an hour. Where the increase is on a percentage basis, it has been between 5 and 10%.

This pattern is disclosed by a check of the last 26 wage settlements in the industry reported to the U. S. Bureau of Labor Statistics.

An exception is Detroit Edison. The company rejected a recommendation of a 3% increase, with a minimum of 5¢ an hour, made by a commission set up under Michigan's Bonine-Tripp Law regulating utility labor disputes. The company reached a different agreement with the CIO Utility Workers Union before expiration of a 10-day cooling-off period. It agreed to give the same in rease, retroactive to June 1, which becomes the fourth-round pattern in Detroit's auto and steel plants.

Here are some of the settlements, with the union and approximate number of employees affected:

Alabama Power Co, IBEW, 1,500 employees—8.3%.

Appalachian Electric Power Co, IBEW, 900 employees—5¾¢.

Connecticut Power Co, IBEW, 400 employees—5¢.

Florida Power & Light Co, IBEW, 1,800 employees—9%.

Georgia Power Co, IBEW, 2,500 employees—8%.

Kansas City Power & Light Co, IBEW, 2,000 employees—5.19%.

Kansas Electric Power Co, IBEW, 250 employees—5%.

Long Island Lighting Co and two subsidiaries, IBEW, 2,800 men—5%.

Mississippi Power & Light Co, IBEW, 400 employees—8.3%.

New York Power & Light Corp, IBEW, 7,500 employees—6%.

Northern States Power Co, Minneapolis, IBEW, 1,500 employees—8¢.

Ohio Public Service Co, Cleveland, IBEW, 750 employees—5¢.

Pennsylvania Electric Co, Johnstown, IBEW and UWU, 1,700 employees—6%.

Pennsylvania Power & Light Co, Allentown, independent union, 5,000 employees—4½¢.

Public Service Co of Indiana, IBEW, 1,350 employees—5%.

Rockland Light & Power Co, Nyack, N. Y., IBEW, 250 employees—7%.

Portland General Electric Co, Portland, Ore., IBEW, 1,500 employees—5.15%.

South Carolina Electric & Gas Co, IBEW, 400 employees—10%.

Staten Island Edison Co, IBEW, 250 employees—5 to 10¢.

Toledo Edison Co, IBEW, 1,000 employees—6 to 9¢.

Union Electric Co, St. Louis, IBEW, 1,400 employees—10¢.

Virginia Electric & Power Co, IBEW, 2,400 employees—6%.

Four public utility companies, northern Illinois, IBEW, 11,500 employees—9¢.

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Snohomish PUD to Build 2 Dams on Sultan River

Snohomish County Public Utility District, Everett, Wash., which recently reached an agreement for purchase of the Puget Sound Power & Light Co's distribution system in the county, has voted to proceed with the development of the Sultan River through construction of two dams expected to generate 150,000 kw.

Preliminary work on the $14-million project is expected to start this year, with completion scheduled for 1952. One dam will be 310 ft high while a second, a short distance downstream, will be 150 ft high. Both will be about 4 miles upstream from the Everett Water Department's diversion dam in Sultan Canyon. A smaller dam on Olney Creek will be constructed for water storage purposes.

The larger dam will form a reservoir with a capacity of 83.5 billion gal while the second will back up 3.25 billion gal.

The Sultan River plan, the PUD's first attempt at power generation, was approved by the Federal Power Commission last March. The PUD has awarded a contract to the Harza Engineering Co of Chicago for preliminary engineering.

The Puget Sound power properties purchased by the PUD have a peak demand of 69,000 kw within the county. The purchase will be refinanced with revenue bonds, according to A. H. Murray, PUD manager.

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Grid Network Planned

Plans are being made in Nebraska for construction of an $8-million power transmission network for the eastern part of the state during the next three years. The joint project by Nebraska Public Power System, Consumers Public Power District, and rural electrification districts in that area will add 350 miles to the Consumers system, mostly in rural sections.

Largest Loan by REA Goes to Wisconsin Co-op

Rural Electrification Administration has approved an $8.4-million loan to the Dairyland Power Cooperative, La Crosse, Wis. It was the largest single loan yet granted by the lending agency.

The grant also made the Wisconsin generating and transmission cooperative by far the largest single borrower on REA's books. Dairyland previously had obtained loans totaling $33,862,540 for facilities to serve 25 federally financed distribution co-ops operating in Wisconsin, Minnesota, Iowa, and Illinois.

The new loan, approved July 8 in Washington, D. C., will finance construction of a new generating plant, addition to an existing plant, 95 miles of transmission lines, 10 substations, an office building and warehouse, and other facilities. Co-op officials reported these additions eventually would give Dairyland generating capacity aggregating 119,150 kw and about 2,100 miles of transmission lines.

The co-op's new steam generating plant, with a capacity of 15,000 kw, will be located at Cassville, Wis. Estimated cost is $5,802,000. The loan authorization allocates $1,053,000 for installation of a third boiler at Dairyland's Alma steam plant. Of the remaining loan funds, $743,500 is earmarked for transmission lines and $235,000 for the substations.

Co-op spokesmen said the new facilities were found necessary to meet the rapid load growth of the distribution co-ops served by Dairyland. Power use on the lines of these distributors has doubled in the past three years, these sources said.

Previous top REA loan was the $7,595,500 grant last January to Central Electric Power Cooperative, a new transmission co-op with headquarters at Columbia, S. C.

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B. C. Power Commission to Sell Energy to Utility

The provincially owned British Columbia Power Commission is entering a new phase in its development by supplying electrical energy to British Columbia Electric Railway Co, largest private concern in Canada's far western province.

The public corporation for the first time is coming into BCER's field by signing a 25-year agreement to provide a minimum of 17,500 kw from its Hart Hydro Development at Campbell River on northern Vancouver Island to BCER's Greater Victoria system on the southern portion of the Island, beginning Oct 1, 1950.

The Commission will deliver power at Nanaimo, 76 miles north of Victoria, and BCER will deliver it south to the capital city over a $2-million transmission line now under construction.

The Commission has agreed to supply up to 42,500 kw a month.

At present BCER has hydro plants at Jordan River and Goldstream and a steam plant at Brentwood, which are working to near-full capacity.

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Back Dividends Awarded

A demand by public stockholders of North American Light & Power Co for 60¢ a share in back dividends paid by Illinois Power Co has been approved by U. S. District Judge Paul Leahy at Wilmington, Del. Earlier he had approved the North American Light dissolution plan providing that its stockholders receive three tenths of a share of Illinois Power for each share of North American Light. North American contended the public holders were not entitled to the Illinois Power dividends since June, 1947, because the stock had not yet been distributed.

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Municipals Held Exempt

Indiana's 1947 Compulsory Utility Arbitration Act does not apply to differences between municipal utility employees and the officers of a labor union, according to an opinion by Attorney General J. Emmett McManamon. The opinion was sought in connection with a labor dispute involving the Fort Wayne municipal system and the AFL-International Brotherhood of Electrical Workers.

FUELED FROM volcanic steam jets, power stations at Lardarello, Italy, were completely rebuilt after war. Two new plants, with 250,000 kw combined capacity, are being added

Italy Adding 2 Volcanic Steam Plants in Tuscany

Two new natural-steam power stations being built at Lardarello, Tuscany, will boost Italy's present electric power output by approximately 10%.

The project ranks near the top of Italy's postwar power expansion program, designed to meet an annual deficiency officially estimated at some 13 billion kwhr. Only in 1957, when plants, mostly hydro, now being built or planned at an estimated total cost of $1 billion will be in operation, will the deficit be covered.

Lardarello's new stations will have an installed capacity of 250,000 kw. Their annual output of about 2 billion kwhr will go to the Italian State Railways. Lardarello's present capacity is 150,000 kw.

Utilizing the boracic steam jets found there, Lardarello's plants were developed rapidly before the war. In 1943, they attained a maximum production of some 900 million kwhr. These plants were almost completely wrecked in 1944 but have been rebuilt.

A new system will be employed in the plants now under construction for utilizing steam obtained from new drillings. The steam will be sent directly into a turbine with low pressure discharge in a mixing condenser which was recently fitted with a turbo-vacuum for extracting the gases.

Serious technical difficulties had to be overcome before this system could be applied. The turbo-vacuum apparatus had to be made of special steel resistant to corrosion by the gases contained in the steam. By this means, however, it will be possible to limit consumption of steam to 10 kg for each kwhr generated, resulting in 50% fuel saving over the prewar plants and 25% over the rebuilt units.

ONE CUSTOMER, who has elevators in three nearby buildings, is not enough business for this 50-year old d-c generating plant of the Arkansas Power & Light Co; so it will be closed. Frank Beale, left, underground superintendent, and W. G. Shurgar, division superintendent, discuss dismantling the plant, located in Little Rock office of AP&L

Laboratory Men Allowed to Quit Production Union

Production laboratory employees at Detroit Edison's Delray power plant have asked the National Labor Relations Board to separate them from the overall bargaining unit of production employees represented by the CIO Utility Workers Union.

NLRB granted the five coal analysts involved a decertification election as the CIO union was authorizing a strike over wages and other contract issues. If they vote against the CIO-UWU, they will not be represented by any union.

Detroit Edison took no position in the dispute. In 1943 the CIO union won bargaining rights at the Delray plant, but the unit did not include the production laboratory. Three years ago, at the union's request, the company voluntarily lumped the coal analysts into the group represented by the union.

NLRB ruled that, as technical employees, the coal analysts may constitute a separate unit if they wish.

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Battelle Expands Research

Battelle Memorial Institute, Columbus, O., has completed a new laboratory area, enlarged its electrical engineering staff, and embarked on an expanded program of electrical engineering research aimed at serving companies not equipped to conduct their own studies. Research studies will include circuits, electrical machines, instruments, servomechanisms, analogue computators, electromagnetic fields, high-frequency equipment, materials testing, development of electrical conducting and magnetic materials and their testing, and illumination.

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Increases Generator Size

Mississippi Power Co has increased the size of the high-pressure generating unit to be installed in its new plant at Meridian from 40,000 hp to 58,000 hp. The change in capacity will increase cost from $5 million to $5.5 million. A new 110-kv line, approximately 110 miles long, will be constructed to connect the plant at Meridian with the one at Hattiesburg.

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Tacoma May Intervene

Tacoma, Wash., has been granted permission by Federal Judge Charles H. Leavy in that city to intervene in the condemnation cases of the Kitsap and Thurston PUD's against the Puget Sound Power & Light Co. Both the PUD's and the City seek certain distribution and generation facilities.

All Hungarian Engineers Are Ordered to Register

(McGraw-Hill World News)

All Hungarian engineers have been ordered by government decree to register with the Hungarian Scientific Council. Purpose of the compulsory registration, according to government spokesmen, is to determine exactly what engineers, architects, and technicians are available for reassignment under the country's Five Year Plan. A shortage of professional men reportedly prompted the action.

This latest move closely follows a government decision to break up the Engineer and Architects' Trade Union, an organization in which most Hungarian engineers held membership. Instead, the engineers have been instructed to affiliate with individual labor unions according to their specialty. A design engineer, for example, working in a plant has to join the same trade union to which the factory workers belong.

In each trade union, where engineers become affiliates, a special secretary is assigned to represent the interests of the professional personnel. In nationalized Communist-controlled Hungarian industry it is the unions that place and fill staff vacancies.

Under the new order requiring registration all engineering societies have been brought under the control of the Scientific Council.

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Abbett Heads PSC Again

Hugh W. Abbett has been appointed chairman of the Indiana Public Service Commission by Gov Henry F. Schricker. An engineer with the Marion County Rural Electrification Membership Cooperative, Abbett succeeds former Judge Roscoe O'Byrne, Brookville. Abbett was PSC chairman the last two years of the previous Schricker administration.

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PUD Acquires Facilities

Pend Oreille County PUD has taken over operation of the Mountain States Power Co facilities at Newport, Wash., after completing a $326,896 purchase, and has announced it will reduce rates after June 30. The purchase gives the PUD control of all service in the Newport and Metaline areas. Washington Water Power Co is still operating in the Calispel Valley, but the PUD has a condemnation suit pending against that property.

SEC RULINGS

Delaware Power & Light Co has received authorization to issue and sell $10,000,000 of first mortgage and collateral trust bonds, due 1979, and 50,000 shares of preferred stock cumulative ($100 par), subject to the results of competitive bidding. Proceeds would be used to finance a portion of the construction program of Delaware Power and its subsidiaries. (Release No. 9191).

General Public Utilities Corp's amendment to its declaration in regard to a cash capital contribution by GPU to its subsidiary, New Jersey Power & Light Co, has been approved. New Jersey was to apply the $1,500,000 contribution in payment of the cost of, or in reimbursement of payments made for the construction or improvement after Apr 30, 1949, of New Jersey's facilities. GPU's amendment stated that due to the determination of New Jersey not at this time to issue any additional shares of cumulative preferred stock as had been contemplated, it would not be appropriate for New Jersey to apply the cash capital contribution for construction or improvement cost after Apr 30, 1949. Instead, it will be necessary for New Jersey, according to the GPU amendment file, to apply the cash contribution to provide reimbursement for $1,500,000 of working capital utilized by New Jersey during the 12 months' period ended Apr 30, 1949, for the purchase or construction of new facilities and the betterment of its existing facilities. It was this amendment that SEC permitted to become effective. (Release No. 9207).

Narragansett Electric Co has been authorized $1,400,000 of additional bank borrowings between now and July 31, 1949, in order to pay off notes maturing on or before that date and to provide new money for construction and reimburse its treasury for prior construction expenditures. At the same time, the commission approved a stipulation agreed to by Narragansett's parent, New England Electric System (Boston) and certain of the latter's subsidiaries, under which future bank borrowings by such subsidiaries under authority of an earlier order of the commission would be limited to $500,000 of borrowings by Worcester County Electric Co. (Release No. 9212).

Kansas Electric Power Co. Lawrence, has been authorized to merge into its parent, Kansas Power & Light Co, Topeka. The companies are subsidiaries of the North American Light & Power Co, which is in the process of liquidation. Upon such liquidation, its stock interest in Kansas Power will be transferred to North American Co, which has filed with the commission a plan for distribution of the Kansas Power stock to its common stockholders of record Aug 2, 1949. Under the merger agreement, Kansas Power will acquire all of the assets and business of Kansas Electric and, in consideration thereof, will assume all of the latter's debts and liabilities. All shares of common stock of Kansas Electric are to be cancelled upon the merger becoming effective. (Release No. 8213).

Texas Utilities Co's issuance and sale of 400,000 shares of its common stock to American Power & Light Co, parent company, and the investment by American in Texas Utilities of $7,000,000 in the purchase by American of said 400,000 shares of the common stock of Texas Utilities are necessary or appropriate to the integration or simplification of the holding company system of which American is a member and are necessary or appropriate to effectuate the provision of Section 11 (b) of the Public Utility Holding Company Act, SEC has ruled. (Release No. 8214).

Ticonderoga Electric Light & Power Co, Albany, N. Y., has been authorized to merge into its parent, New York Power & Light Corp, also of Albany. Under a May 2, 1949, order of the commission, New York Power acquired all of the outstanding capital stock of Ticonderoga. (Release No. 9217).

New Jersey Power & Light Co has received authorization to offer its $3,500,000 of first mortgage bonds, due 1979, for sale at competitive bidding. Proceeds of the financing would be applied to the company's construction program. The application originally included a proposed offering of 20,000 shares of $100 par preferred stock in addition to the bonds, but an amendment filed July 5 eliminated the preferred stock from the present financing. (Release No. 9216).

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Idaho Power Buys Co-op

Idaho Power Co has purchased the Malheur Cooperative Electric Association, Vale, Ore., for some $473,000. The system includes about 400 miles of line serving 640 customers in Malheur and Baker Counties in eastern Oregon and in Payette County, Idaho.

MEETINGS

American Institute of Electrical Engineers
Pacific General Meeting, Fairmont Hotel, San Francisco, Calif., August 23-26; Midwest General Meeting, Netherland Plaza Hotel, Cincinnati, Ohio, October 17-21.

Maryland Utilities Association
Fall Conference, Cavalier Hotel, Virginia Beach, Va., September 9-10.

Rocky Mountain Electrical League
Fall Convention, Stanley Hotel, Estes Park, Colo., September 11-14.

Instrument Society of America
Clinic on Maintenance of Industrial Instruments, Statler Hotel, St. Louis, Mo., September 9-12; Annual Convention, Municipal Auditorium, St Louis, September 12-16.

Missouri Valley Electric Association
Rural Round-Table, President Hotel, Kansas City, Mo., September 14; Sales and Rural Conference, President Hotel, Kansas City, Mo., September 15-16; Accounting Conference, Robidoux Hotel, St. Joseph, Mo., October 20-21.

Public Utilities Association of the Virginias
Annual Meeting, Greenbrier Hotel, White Sulphur Springs, W. Va., September 16-17.

American Chemical Society
National Meeting, Hotel Traymore, Atlantic City, N. J., September 18-23.

Southeastern Electric Exchange
Engineering and Operating Section, Hotel Roanoke, Va., September 19-20; Accounting Section, Henry Grady Hotel, Atlanta, Ga., September 22-23; Personnel Administration Section, Henry Grady Hotel, Atlanta, Ga., September 23; Sales Conference, Biltmore Hotel, Atlanta, October 26-28.

Illuminating Engineering Society
National Technical Conference, French Lick Springs Hotel, French Lick, Ind., September 19-23.

Pennsylvania Electric Association
Annual Meeting, Benjamin Franklin Hotel, Philadelphia, Pa., September 20-21; Transmission and Distribution Committee, Fort Ligonier Hotel, Ligonier, Pa., October 20-21.

Edison Electric Institute
Accident Prevention Committee, Robert Treat Hotel, Newark, N. J., September 22-23; Electrical Equipment Committee, Hotel Van Curler, Schenectedy, N. Y., October 3-5; Meter and Service Committee, Leland Hotel, Springfield, Ill., October 3-5; Transmission and Distribution Committee, Lord Baltimore Hotel, Baltimore, Md., October 31-November 1.

Wisconsin Utilities Association
Annual Convention, Accounting Section, Dell View Hotel, Lake Delton, Wis., September 22-23; Joint Annual Convention, Electric and Gas Sections, Schroeder Hotel, Milwaukee, November 21-23.

National Electronics Conference
Edgewater Beach Hotel, Chicago, Ill., September 26-28.

Indiana Electric Association
Annual Convention, French Lick Springs Hotel, French Lick, Ind., September 28-30.

National Television and Electrical Living Show
Second Annual Show, Sponsored by Chicago Electric Association, Chicago Coliseum, September 30-October 9.

National Association of Corrosion Engineers
South Central Region, Adolphus Hotel, Dallas, Tex., October 3-4.

Association fo Iron and Steel Engineers
Annual Convention (without exposition), William Penn Hotel, Pittsburgh, Pa., October 3-6.

Canadian Electrical Manufacturers Association
Annual Meeting, General Brook Hotel, Niagara Falls, Ont., Canada, October 4-6.

Iowa Utilities Association
Management Conference, Hotel Fort Des Moines, Des Moines, Iowa, October 10-11.

American Society for Testing Materials
First Pacific Area National Meeting, Fairmont Hotel, San Francisco, Calif., October 10-14.

American Standards Association
Annual Meeting, Waldorf-Astoria Hotel, New York, October 11-14.

Intrenational Association of Electrical Leagues
Annual Conference, Hotel Cleveland, Cleveland, Ohio, October 12-15.

Electrochemical Society
Fall Congress, La Salle Hotel, Chicago, Ill., October 12-15.

National Safety Council
National Safety Congress and Exposition, Stevens, Congress, Morrison, Sherman Hotels and the Palmer House, Chicago, Ill., October 24-28.

National Metal Trades Association
Annual Convention, Palmer House, Chicago, October 26-28.

National Electrical Contractors Association
Annual Convention, Rice Hotel, Houston, Tex., November 8-11.

National Electrical Manufacturers Association
Annual Meeting, Chalfonte-Haddon Hall, Atlantic City, N. J., November 14-18.

Refrigeration Equipment Manufacturers Association
All-Industry Refrigeration and Air Conditioning Exposition, Atlantic City Auditorium, Atlantic City, N. J., November 14-18.

No Additions this week.

Production Increase Lowest Since 1945

The 2.2% increase in energy production for the week ended July 23 was the lowest reported since the week ended Aug 11, 1946, when the increase over the corresponding week of the previous year was 0.4%. For the week ended Sept 13, 1948, a 2.2% increase was also reported, but this was due to a shift in a holiday.

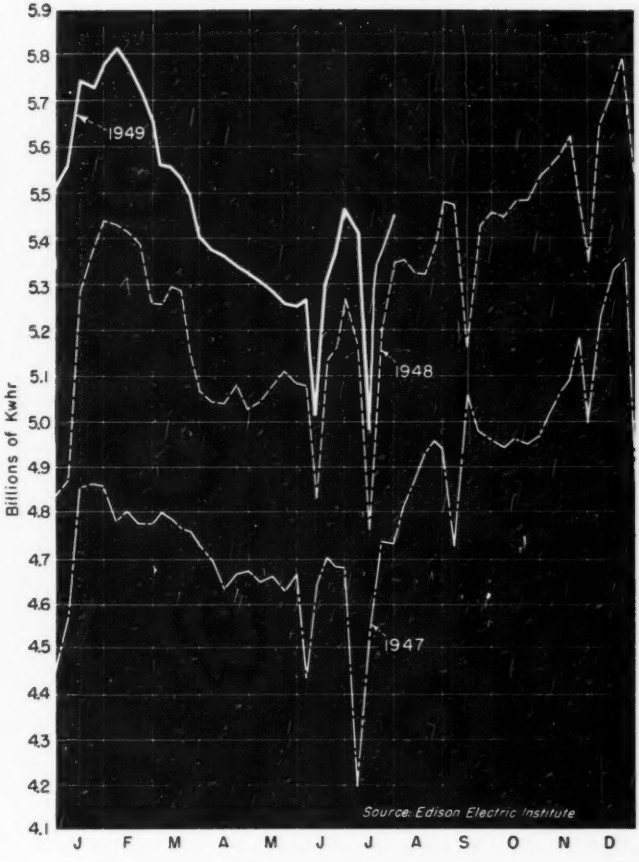
Output for the week ended July 23 was 5,461,665,000 kwhr. For the corresponding week of 1948, the figure was 5,342,127,000 kwhr. The consistently downward trend of production over last year has put an end to all serious talk of a capacity shortage. Utilities, however, are continuing their huge programs of power plant construction. In the first six months of this year they added 2,110,426 kw.

Weekly Output, Millions Kwhr

1949		1948		1947	
July 23	5,462	July 24	5,342	July 26	4,730
July 16	5,342	July 17	5,197	July 19	4,732
July 9	4,982	July 10	4,760	July 12	4,531
July 2	5,410	July 3	5,166	July 5	4,190
June 25	5,466	June 26	5,257	June 28	4,675
June 18	5,373	June 19	5,159	June 21	4,676
June 11	5,300	June 12	5,132	June 14	4,702
June 4	5,018	June 5	4,845	June 7	4,635
May 28	5,270	May 29	5,076	May 31	4,429
May 21	5,255	May 22	5,085	May 24	4,663
May 14	5,257	May 15	5,109	May 17	4,616
May 7	5,284	May 8	5,087	May 10	4,653

Percent Change from Previous Year

	July 23	July 16	July 9
New England	+ 2.5	+ 5.0	+ 7.8
Mid-Atlantic	— 0.8	— 1.9	— 1.2
Central Industrial	— 2.2	— 3.0	+ 0.5
West Central	+ 3.0	+ 1.7	+ 7.9
Southeast	+ 1.7	+ 5.0	+ 4.9
South Central	+ 8.4	+13.2	+14.4
Rocky Mountain	+15.7	+12.8	+15.0
Pacific Coast	+ 7.4	+ 8.2	+ 9.1
Total United States	+ 2.2	+ 2.8	+ 4.7



New Jersey Utility Plans $25 Million Expansion

Jersey Central Power & Light Co has outlined a four-year $25 million expansion program, largest in the company's history.

Largest single item is a turbo-generator at South Amboy, to cost approximately $10 million. It will be completed within the next three years and will double the plant's output to 118,000 kw.

Another large-scale installation has already been made at Raritan River plant, Sayreville. A 33,500-hp turbo-generator is in place and expected to begin operation about Aug 1. The total cost of this project, including additional outdoor substation facilities, is estimated at $5.5 million.

Seventeen miles of 66-kv transmission line are being run from Cheesequake to a substation being built near Earle Ammunition Depot. From this substation lines will run to Eatontown and Farmingdale.

An 8,000-ft submarine cable, laid across Barnegat Bay from Ocean Gate to Seaside Park, will tie in with a new substation being constructed at Seaside Park. The cable also will act as a link to an eventual two-way 33-kv feed.

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New Hydro Unit Ordered

Central Maine Power Co has contracted for a 6,000-kw hydroelectric unit for its Williams station at Solone. It is estimated that the new unit, scheduled for installation in the fall of 1950, will raise the plant output by 18,000,000 kw hr annually. Several of the company's Kennebec River hydro plants were originally designed to accommodate future additional units for use with higher stream flows. The Dead River storage project, now under construction, will increase the regulated flow on the Kennebec.

Penelec Plans Acquisition of 3 Small Utility Systems

Pennsylvania Electric Co has applied to the Pennsylvania Public Utility Commission for permission to acquire the franchises and facilities of three small utility companies. They are the Cresson Electric Light Co, Gallitzin Electric Light Co, and Hastings Electrical Co. All have headquarters at Cresson. They serve 2,845 consumers in five communities in northern Cambria County. Penelec is connected with each of the three.

Present owner of the companies is Pennsylvania Coal & Coke Corp, whose employees have been operating the utilities since the latter have no employees of their own.

If the PUC approves, the three systems will become a part of Penelec's Eastern District with headquarters at Altoona. The lower Penelec rates also will prevail.

WASHINGTON COMMENT

WILLIAM B. WHICHARD

THOUGH of smaller caliber than originally planned, that's a real gun Rep Emanuel Celler is pointing at the insurance companies. And, if it ever goes off, it may do considerable damage to the utility industry. It could well impede the industry's already difficult job of financing its tremendous expansion program.

The Brooklyn Democrat had expected to mastermind a joint House-Senate investigation of insurance companies. Blocked in this effort, he has decided to include, as a sort of sideshow feature, a lesser probe of insurance firms in the current monopoly investigation of his House Judiciary Committee.

As everyone knows, Representative Celler doesn't like the way insurance companies invest their funds. As the utility industry now is aware, he especially objects to heavy investments of insurance firms in securities of gas and electric utilities.

Twice this year, once before a local regulatory body and later before the Federal Power Commission, he intervened in efforts to prevent transactions of this type. In both instances his last-minute oratory was more notable for its dramatic qualities than for any effect on decisions of the commissions.

But these protests served to point up his determination to do something—it wasn't clear just what—about investment of insurance funds. Obviously, from the Congressman's point of view, a Congressional investigation was the logical starting point. But, as chairman of the Judiciary Committee, with its rather limited jurisdictional scope, Celler apparently felt he needed broader basic authority for the type of insurance investigation he had in mind. Hence his move for a House-Senate probe. But neither the House Rules Committee nor the Senate would buy this proposal.

Instead, the New Yorker is forced to content himself with the monopoly study by his own committee. This investigation is billed as an attempt to ascertain what updating, if any, of the present anti-trust laws is in order as a result of recent economic developments. This seemingly would limit the insurance phase of the investigation considerably. But Congressional investigations have a way of getting far beyond their advertised objectives.

Representative Celler, in his aforementioned attempts to upset purchases of utility securities by insurance firms, indicated serious concern over the marked upswing of insurance company investments in utilities. This investment admittedly has been tremendous. As of last May 31, the Institute of Life Insurance estimated insurance company holdings of public utility bonds—exclusive of railroad securities—at a total of $8,858 million. In the year ended May 1, it was estimated insurance firms acquired $457 million of these bonds.

In view of the utility industry's vast expansion program, these totals should amaze few people who know anything about the facts. Utility equipment, electric generating equipment in particular, is costly. Only a few investors, like insurance firms, have funds available in chunks of the size required to finance a big gas pipe line or electric generating plant.

When the financial markets are full of ready cash and a utility has plenty of time to finance its plant additions, a case can be made for the desirability of attracting new investors. Neither of these conditions prevails now, however. Nor is this a time to shackle any source of funds for utility expansion.

TECHNICAL NOTES

ARCHER E. KNOWLTON

Steel of open-hearth quality is readily produced in a new turbo-hearth in which turbulence and heat generation are afforded by the combustion air jets impinging on the surface of the liquid iron. No external heat is required.

Pressurized operation of boiler furnaces would make the induced-draft fan (a tough maintenance item) a waning necessity. Air leakage, boiler efficiency and forced-draft fan power are likewise benefited.

Industrial distribution systems can take the most appropriate of nine principal patterns but of these five are usually superior: loop-primary radial, primary selective radial, banked secondary radial, simple network and primary selective network.

Transformer reactance for rectifier application is double what is used to be partly because of urge on part of electrochemical users and partly because voltage regulators are more extensively used.

Rectifiers supplying essential light and power loads in public buildings must have high selectivity among protective circuit breakers and among mulitple units if service interruptions are to be minimized.

Foaming in boilers is essentially a chemical problem of control through water conditioning. Carryover can be traceable to priming, atomization and leakage as well as foaming.

Microwave antennas at the focus of paraboloic reflectors permit transmission effectively with a fraction of a watt. Multi-element antennas achieve similar gain.

Two receiving antennas a short distance apart (on the same tower) will usually overcome the fading from microwave phase differences of signals arriving over different paths.

PLANNED LIGHTING CENTER in power company main office. Modern applications of commercial and industrial lighting are demonstrated here and customers make selections from display of fixtures available from local dealers

How to Sell Commercial Lighting

"Man Who Plans," schooled in good customer relations and concepts of modern commercial lighting, stimulates and promotes planned lighting

ESTIMATED ADDITIONAL annual revenue of $11.19 and additional connected load of 280 w are the New Orleans Public Service, Inc. averages per customer call in selling planned commercial lighting. Value per call of lighting fixtures sold by dealers averages $32.

In the twelve-month contest period ending February 28, 1949, 45,583 calls were made by the company's 20 commercial section salesmen on their 17,500 customers. Of the total calls, 18,000 were directly concerned with lighting. Estimated annual revenue of $201,412 resulted from these 18,000 calls—and from the intensive planned lighting promotion that paved the way for them. Total number of lighting installations sold was 1,195 for a load increase of 5,035 kw. For these installations dealers sold new lighting fixtures to an estimated value of $575,000—profitable business for the power company and for dealers and, judging from appreciative letters included in the contest presentation, for customers too.

It is fitting that the New Orleans accomplishment in selling planned commercial lighting be related to customer calls because the whole sales activity is built around the "Man Who Plans". The single object of dealer training and encouragement, of advertising and other publicity, of all promotional means employed, is to help and support the "man who plans" in his daily contacts with customers.

The "man who plans" was not hired by NOPSI as such. He was

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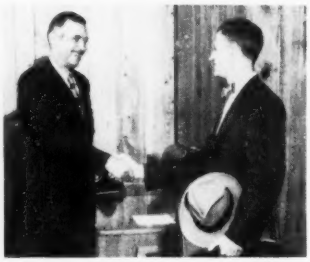


"The Man Who Plans" makes his initial call on owner of Martha Jane's Melody Lane

1 Planned lighting will sell for you

Selling depends on seeing. Customers will see your merchandise best under light that has been planned to sell

4 Which fixtures do you like?

Contractor, salesman and lighting specialist advise customer in selection of fixtures at the power company's Lighting Center

5 Keep it in first-class shape

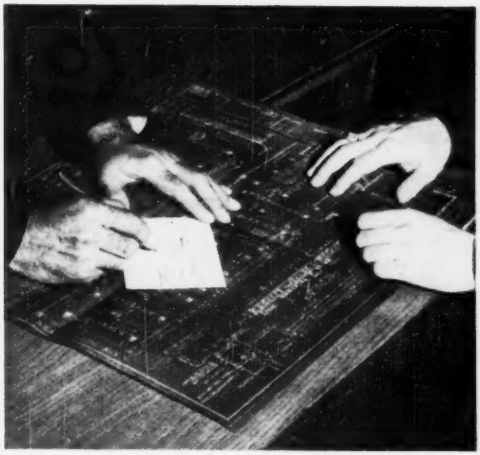
Clean fixtures and new bulbs and tubes replacing spent ones are necessary for maintenance of lighting quality

trained for his job after he was hired. First he was introduced to the entire company through the "indoctrination program", a month of organized observation and explanation of company operations and of meeting and getting acquainted with company personnel. Thus he gained a clear understanding of company policies and practices in relationship to customers. Also he was shown how the company's security and his own in its employ depend on preservation of our American system of free enterprise. Following indoctrination, he came into the direct guidance of his section supervisor for training in his specific job responsibilities. Experience has shown that this stage of training can be handled better without set schedules since its scope and speed depend on each individual's education, previous experience, aptitude and quickness to absorb instruction.

During this time the incipient "man who plans" received a thorough schooling in the fundamentals of modern lighting. He studied in the GE-LaSalle training course. He learned the load-building and service features of commercial lighting and was shown how these are effectively

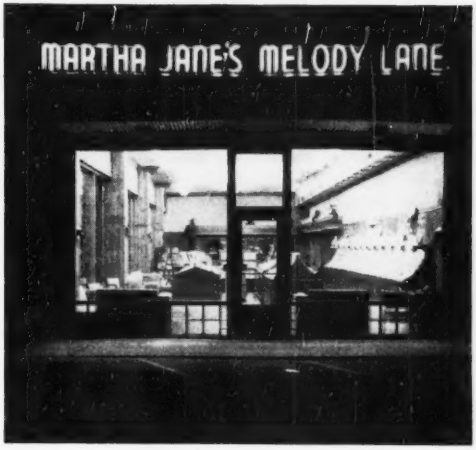
2 We'll make a layout for you

Lighting specialist is now called in. He collects the data necessary for the design of an engineered installation



3 Customer signs contractor "lead" card

Prints of layout will go to the contractors designated by the customer, who will submit bids for making the installation



6 "Come in," says the store to passersby

The whole store is a show window, inviting people on the street to stop and look and enter

7 And inside, planned lighting sells the goods

Attractively displayed and persuasively lighted, merchandise appeals to lookers and converts them into buyers

handled through the Planned Lighting Program. Also there was instilled in him the confidence and enthusiasm which supervised experience would later polish into resultful selling ability.

When he was finished with the training period successfully and thus had earned standing as the "man who plans", he found he was not yet out of school, and never would be as long as he remained in the sales department. He is now enrolled in a program of continuous training with all members of the department. Every week he attends a company-time meeting where he learns something more about his job. In these meetings films and other training aids play a large part. Also he is encouraged to prepare and present discussions on various aspects of his job.

Effective in preparing the way for the "man who plans" and in backing up his activities is the dealer division of the sales department. Assigned the responsibility of working with customers, who are also sales allies because they are affected by and necessary to the company's efforts to promote and stimulate business, the dealer division co-ordinates the commercial planned lighting activity

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with architects, builders, electrical contractors, realtors, manufacturers' agents, jobbers, dealers, wholesalers and consulting engineers. By conducting lighting classes to train personnel in the employ of these allies, by keeping in close touch with their owners and executives, and by fostering co-operative programs with them, the dealer division carries on a continuous educational program.

Helps for Sales Allies

The dealer division also handles contacts with sales allies on individual projects, as in one instance, getting modern lighting included in an architect's plans. In addition, dealer division men make routine calls urging sales allies to avail themselves of company helps in promoting and handling lighting business. These helps include the use of company mailing lists for sending out product advertisements, the company addressing the envelopes; training of sales people in company courses; engineered lighting layouts; joint calls on customers with company sales personnel; leads on fixture and equipment sales.

The company sells no commercial lighting equipment. After the "man who plans" has sold the customer on planned lighting and an engineered layout has been made, the customer is asked to sign a "lead" card which is turned over to the dealer division. The card names two dealers preferred by the customer as suppliers of the needed equipment. These dealers are notified and it is then up to them to sell their goods.

Supplementing the routine and specific contacts with sales allies is a company publication, *Profits*, put out by the promotion and research division of the sales department. It is pointed directly towards sales opportunities and has a circulation of 1,500 to dealers and distributors.

Recently set up in the downtown company office is the semi-permanent lighting display structure pictured at the head of this article. The display, covering a floor area of 500 sq ft, features applications of office, store and factory lighting. In front of the display, not visible in the picture, is a comprehensive exhibit of the various types and forms of modern fixtures available from all or most local dealers. Here the prospective buyer can decide on the fixture he wants.

Newspaper advertising, stickers on commercial customers' bills and other promotional means are used to publicize the planned lighting center. Frequent changes of fixture and equipment exhibits and periodic refurnishing of the three application demonstrations keep the display fresh and help to maintain customer interest. The center has proved its effectiveness as a sales tool for both the company and dealers who bring their prospects to it to select equipment. Information request cards, manufacturers' literature, selling signs and other promotional material are freely available to the visitor at the center. Lighting fixtures on exhibit are identified by numbers and specifications near the switches by which they are controlled.

Co-ordinated Advertising

Advertising is co-ordinated with other phases of the Planned Lighting Program through close liaison with the advertising department, a separate and completely staffed section of the company responsible for all mass promotion—newspapers, radio, billboards, etc. Advertisements of commercial planned lighting are budgetted each year. Rough copy and layout are produced cooperatively between the advertising staff and the promotion and research division of the sales department.

Implanting ideas and awakening desire, fostering and facilitating the work of the "man who plans", direct mail is in continuous flow to 12,000 commercial customers. Built around the material of the industry Planned Lighting Program, furnished with return cards, and scheduled in selective series mailings, the direct mail activity includes supplemental promotion pieces produced by the promotion and research division.

The division acts in a service capacity for the entire sales department. It works up material for sales letters, advertisements, campaigns, displays and general promotion.

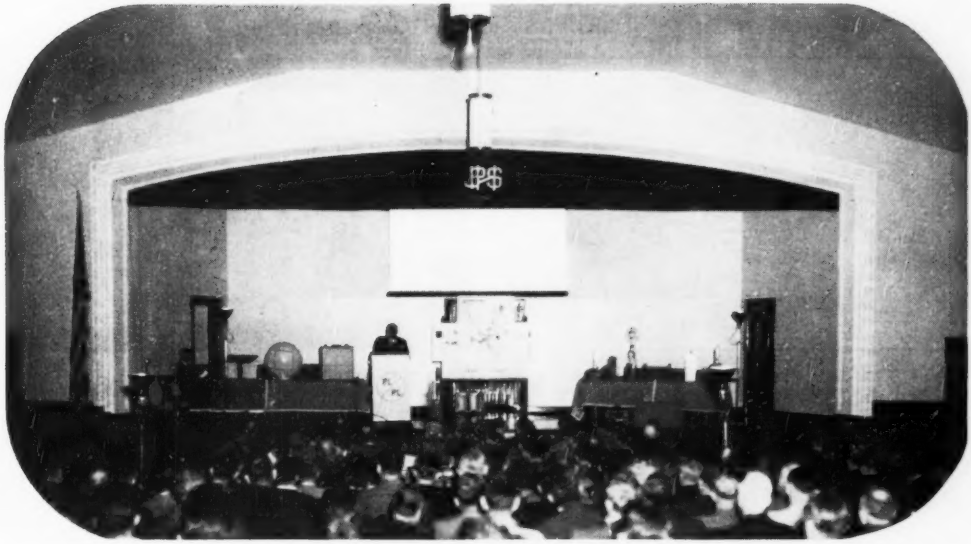
Since direct mail can be only as good as the mailing list, particular attention is given to this point. After each contact with a customer, the commercial representative fills in the correct mailing address on a card which goes to the promotion and research division, thus keeping the mailing list constantly up to date.

Direct mail promotion went to 3,652 retail stores in 1948. It went to 3,900 general offices and to 700 doctors, dentists and other professional men, also to 316 public and private school officials, parent-teacher associations and school planning committees. Reinforcing the flow of direct mail are magazines purchased by the company and sent to commercial customers—*Today's Business, Better Light-Better Sight News, Adequate Wiring Reporter.*

The "man who plans" in New Orleans Public Service is the 20 men who are the customer contact personnel of the commercial section of the sales department. These men are general service salesmen. They have been divided into two groups to handle large and small customers. The large customers are assigned on an individual basis to representatives particularly qualified to deal with their problems. The small customers are allocated by territory, about 1,400 customers to each representative. Over each group is a supervisor who directs training of sales allies as well as of the men in his group and checks the lighting recommendations they make. The supervisors report to the director of the industrial and commercial division whose responsibility it is to obtain maximum results in compensatory revenue and good customer relations.

Year Round Selling

The "man who plans" has a heavy calendar. All year round he plugs various types of commercial lighting. He goes after school lighting in March, April, May, June and September. Seasonal display lighting gets his attention in February and March (Mardi-Gras) and in November and December (Christmas). He is a busy fellow. He has to be. If he were not, New Orleans Public Service, Inc. would not have taken first prize in the commercial class of the Planned Lighting Award contest.



PLANNED LIGHTING CLINICS enlisted and trained sales allies—contractors, engineers, architects and dealers—in the techniques of modern lighting

How to Sell Industrial Lighting

Continuous contact with customers by industrial representatives reinforced with direct-mail and other promotion and by education of engineers and architects in planned lighting

ESTIMATED annual revenue of $77,748 from 1,767 kw of new load in 287 installations was the partial result of 1948 promotion of planned industrial lighting by the Pennsylvania Power & Light Co. This is a partial result only, because the promotion is a continuing one, in which yesterday's selling appears in today's sales.

In its 9,400 square miles of service territory PP&L has 4,061 industrial customers. Planned lighting presentations were made to 2,252 of them resulting in 736 prospects. For these prospects 440 planned lighting layouts were prepared. Over 65% of the layouts resulted in installations. The ratio of installation to presentations was one in less than eight which, in terms of selling as opposed to order-taking, is pretty good going.

Over a third, 91, of the 287 installations sold were in the range of 10 to 60 ftc, and 17 were over 60. The remainder ranged from 20 to 40.

The 1948 promotion was in three parts. Lighting was featured in the company's sustained program of sales presentations to its industrial customers. A summer lighting campaign was staged to hold interest during the off months. This was followed by an all-out fall campaign spearheaded by the excellent promotional material available in the national Planned Lighting Program.

The industrial sales organization of the company, through which the 287 lighting installations were sold, appears in the accompanying diagram. Direct contact with customers is maintained by the 33 industrial representatives who handle all services. It is the representative's responsibility to propose to the customer new lighting applications or improvements in line with modern practice. In this he is assisted by the division lighting representative.

During 1948, eight new industrial representatives were added. To them intensively, and to all other industrial sales personnel as a refresher, was given the EEI-NEMA basic sales training course. The new men were also given a course in lighting in which the Westinghouse "Illumination—Fundamentals and Applications" was combined with additional instruction material organized by the PP&L lighting director. Division lighting representatives were the instructors in this course which included lectures, demonstrations and student projects in preparation of technical and sales presentations.

Supplementing the formal training courses was the industrial lighting

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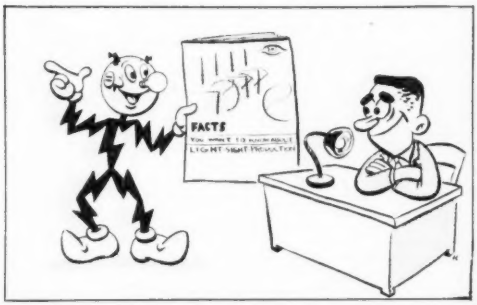
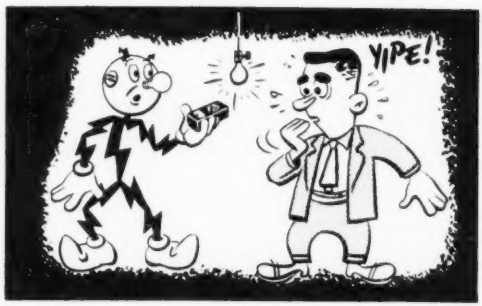
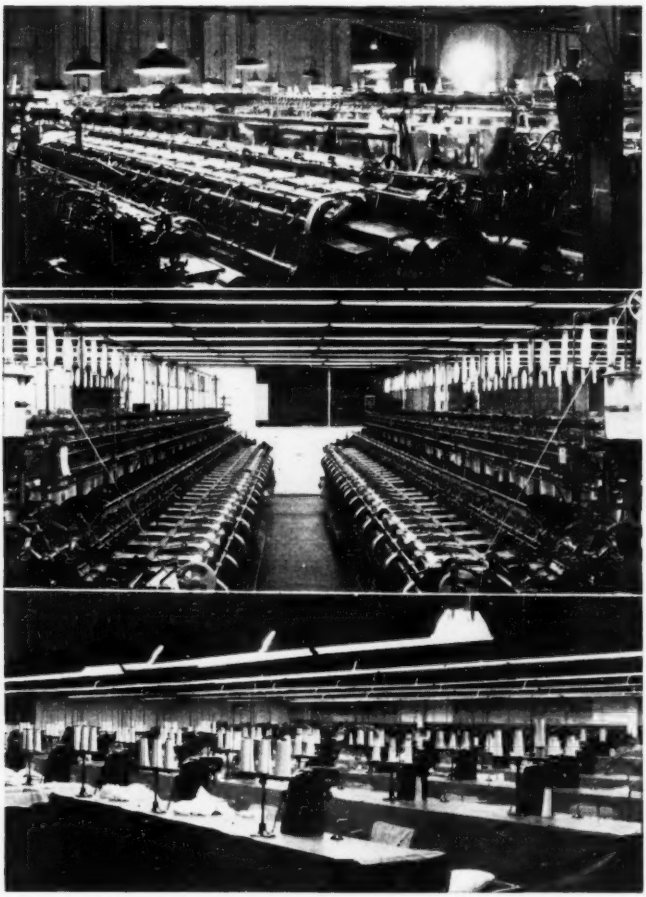
EVERYBODY'S HAPPY WHEN THE LIGHTING'S RIGHTLY PLANNED



Good light, good sight, production high, the three go hand in hand.
And everybody's happy when the lighting's rightly planned



But in such gloom as now exists production deeply slumps;
The workers mope around the place; each man is in the dumps



GLOOM, GLARE AND DROP CORDS characterized the illumination in the Nu-Maid hosiery mill at Stroudsburg before Planned Lighting came along (top picture). In the center is PL's first improvement, 9 rows of 2-lamp RLM furnishing 55 ftc at the needles, installed in 1947. After a year Mu-Maid bought PL for the seamers and loopers (bottom picture)

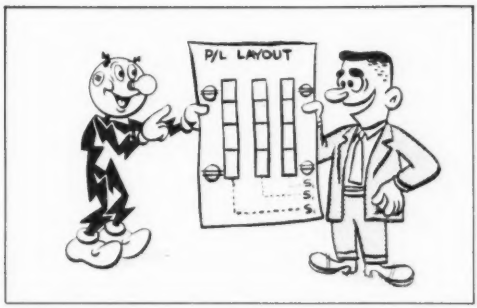
HOW TO SELL INDUSTRIAL LIGHTING *Continued*

conference at Nela Park in the fall of 1947. This conference was attended by eight of the industrial supervisors who passed on what they learned to the field men under them.

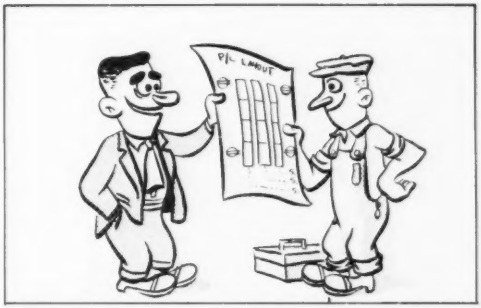
The general office industrial sales department holds periodic conference sessions for all division industrial personnel. One of the conferences was devoted exclusively to lighting at which the chapter on industrial lighting in the EEI Power Sales Manual was reviewed and discussed. Fifty-one persons participated in the conference which was led by the lighting director and covered the techniques, sales aids and methods for the promotion and sale of good industrial lighting. The latest sales tools were described by the lighting director and a field problem worked out. Lighting was also a regular part of the program at all others of these conferences which were supplemented by inspection trips to eight plants of representative industries during 1948.

PP&L's industrial representatives attend the regular meetings and inspection trips of the Illuminating Engineering Society. One meeting of the IES was devoted exclusively to industrial applications in 1948. These meetings afford an opportunity for an industrial representative to meet with contractor and distributor representatives.

All industrial personnel are provided with handbooks and lighting equipment catalogs of various manufacturers showing modern lighting equipment for industry. New publi-



A modern job of lighting for these ills is just the cure;
It boosts morale—sends output high; of that you can be sure



Call in your wiring contractor, for he will understand
The best in modern lighting is installed the way it's planned

(Continued on next page)

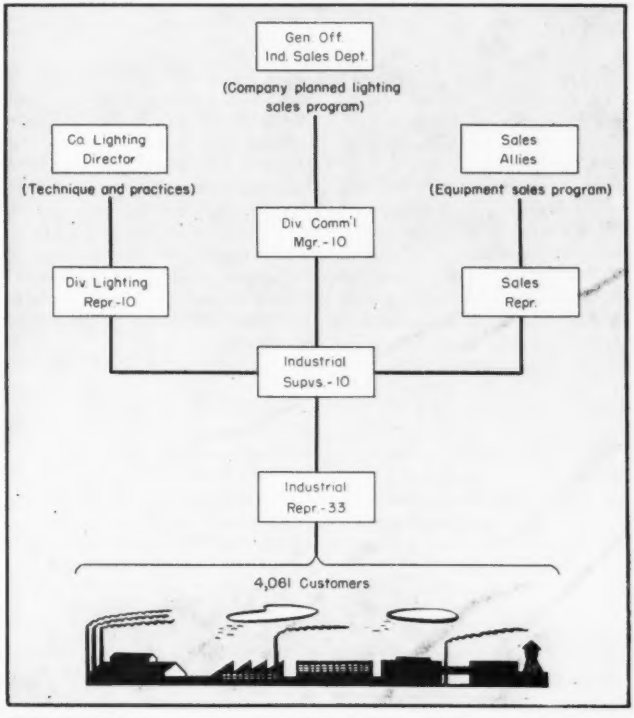
cations or leaflets of articles which will help in the solution of industrial lighting problems are also distributed by the general office industrial sales department as they become available. The industrial representatives are also on the manufacturers' mailing lists and periodically receive publications from this source.

Clinics Cover Lighting Field

Contributing much to industrial lighting promotion was a series of four planned lighting clinics conducted in each of the ten PP&L divisions under the supervision of the lighting director. The clinics covered the whole lighting field, with industrial receiving its proportionate share of attention. They were entirely the work of company men; scripts written, productions staged and presentations made by them. All allied trade personnel were invited to attend and to participate in the ensuing discussions on lighting promotion. These allies included architects, consulting engineers, contractors, electricians, wire men, jobber salesmen, equipment manufacturers, distributors and others interested in the benefits of better industrial lighting. The industrial sales representatives also attended and participated in the discussions at these sessions. The first of these clinics had a total attendance of 980, of whom 309 were PP&L employees and 671 sales allies. The second clinic drew an attendance of 1,348 with 1,058 allies and 290 employees. Figures for the third clinic were 890 total, 632 allies and 258 employees; for the fourth 1,134, 824 and 310. The grand total for the four clinics was 4,352 of whom 3,185 were sales allies and 1,167 employees.

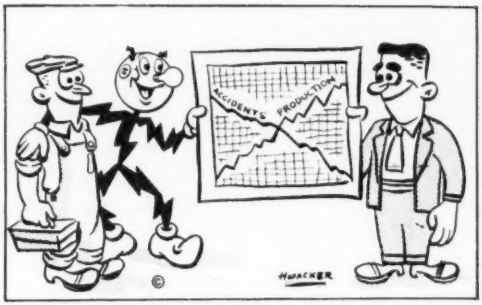
The clinics accomplished a threefold job: (1) Acquainted the local electrical trade with the planned lighting program and its local application and showed how all branches of the industry profited from selling planned lighting; (2) explained the company's sales policy and familiarized members of the industry with the assistance available to them; (3) trained men of all branches of the industry on the fundamentals of illumination.

The complete program, including all technical material and props, was prepared and the necessary demonstration equipment secured. The ten division lighting representatives were



ORGANIZATION for promotion and sale of industrial planned lighting

Then when the job is finished and the gloom is banished quite
You'll find that men do better work with help from light that's right



Not only is production up, but accidents are down
The shop is now a happier place—best lighted plant in town

then brought to the general offices for a week-long training course. They were schooled in the methods of staging the program, using the demonstration equipment, etc, as the effective execution of the program was their responsibility.

The net result of the clinics is that the company figures it now has over 800 men "who plan" distributed throughout the local electrical trade.

In the clinics it was emphasized to the trade that there existed in the company's territory a ready market for nearly eight million dollars worth of business in industrial lighting equipment, installations, and wiring.

Sales control starts with the location and evaluation of markets. Each division compiles estimates of the number of potential new lighting installations, their possible connected load, and the estimated annual revenue to be obtained from them. These divisional estimates are compiled into a company estimate which is combined with estimates for other applications to arrive at a quota total of industrial sales for the year. This total quota is then used to set up a schedule of sales calls for each division and industrial representative. Daily call reports of representatives are compiled into monthly reports from divisions.

Among sales techniques and devices employed, industrial lighting albums were found to be one of the most effective tools. They are kept up to date with pictures of most outstanding plant lighting installations made in local areas. Copies are supplied to all industrial sales representatives so they can show their customers how other plants in the territory are securing the benefit of PP&L's planned lighting. Other sales aids include data and information from manufacturers, reprints of industrial lighting articles, mailings of the magazine *Electrified Industry*, and judicious distribution of the GE fluorescent lighting calculator.

Sales Procedure

The individual sales procedure starts with a survey of existing lighting in the industrial plant made in company with the customer. It covers readings of light intensity with a light meter, considerations of glare from daylight and artificial sources, both direct and indirect, a study of work requirements, consideration of the age of workers, examination of the wiring and the requirements of color discriminations in production operations.

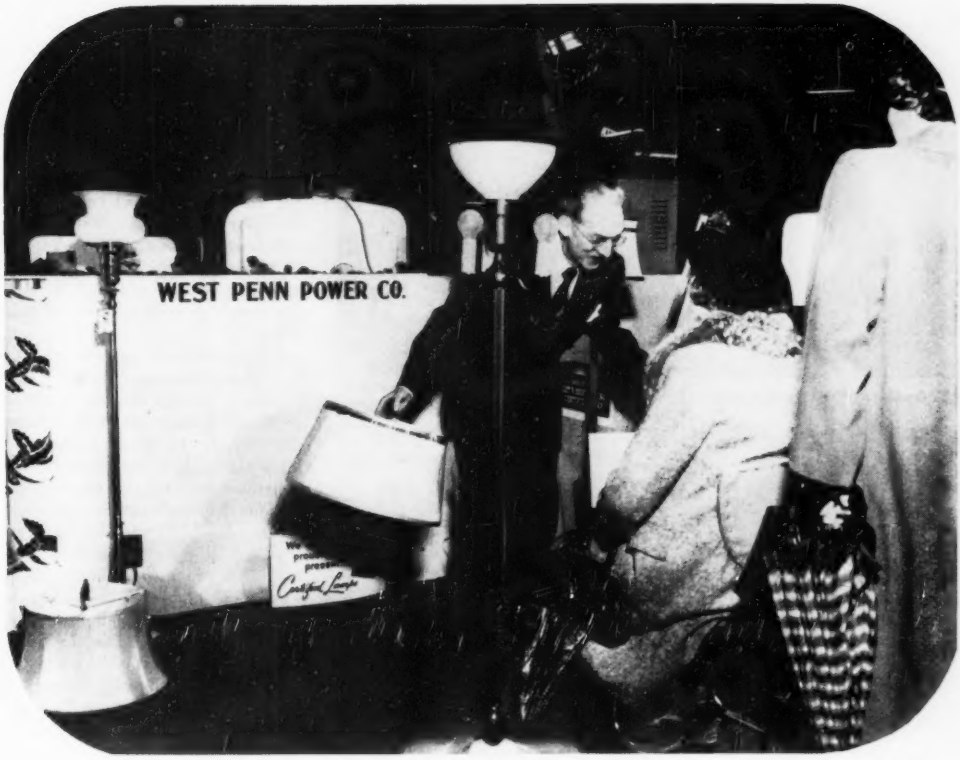
Then, still in close cooperation with the customer, the level of general lighting is determined and decisions on necessity for supplemental lighting are made. Then comes the choice of luminaires, choice of paints, and ways to eliminate glare.

The third step is the preparation of a planned lighting layout which is presented to the customer, explained thoroughly, and immediately followed by the fourth step which is to ask for the order.

During 1948 a 13-week direct-mail campaign was carried on. 5,580 mailing pieces were sent out to 930 selected industrial customers. Direct personal contact follow-up with the EEI "Visualizer" by the industrial representative further stimulated the customer's interest. As a result of this activity, 306 industrial customers requested additional information and 137 lighting layouts were prepared during the campaign for a prospective connected load of 961 kw. At the end of the 13-week campaign 92 lighting installations in plants were made, totalling 392 kw of connected load. These figures do not present the total results from this campaign because inquiries are still being received some months afterwards.

Offer of the booklet *Facts You Want to Know About Lighting and Production* was sent out by industrial representatives to their customers. The booklets were delievred personally by the representatives to those who requested it. Each month 1,493 copies of *Electrified Industry* are mailed to industrial customers and contractors. 107 copies go to company personnel.

Promotion of modern lighting is an important element in PP&L industrial power sales activity. This is because good lighting offers its benefits of improvement in quantity and quality of production, of accident reduction, and of bettered employee morale to every industrial customer. Other electric applications are more special in that they are limited according to types and kinds of manufacturing operations. But lighting is a service used by all, and as such merits heavy general emphasis in power selling.



WAY TO GET THE ORDER is to ask for it

How to Sell Home Lighting

Three-way market approach—direct to customers by advertising and other promotion, educators' interest in conservation of vision, and sales stimulation of dealers

IN 1948 residential customers of the West Penn Power Co averaged nearly $9 in purchases of lamps and lighting equipment. About $6.50 of the $9 was for portable lamps. These average figures represent a gross business of $2,240,000 for dealers in the company service area. Thus it is that promotion of planned home lighting was of double benefit to West Penn—in load building and in holding good dealer relations.

This promotion is carried on by two methods, broad customer education and intensive market stimulation. Objectives are to create among residential customers a better appreciation of the need for and desirability of planned lighting and to stimulate dealers to greater effort in selling the types of fixed and portable equipment that give their customers the values of planned lighting.

West Penn serves an area of 8,700 sq mi in western and north central Pennsylvania having a population of 1,110,000. Some of this territory is highly industrialized but most of it is rural. There are only five towns with populations over 20,000. The largest is 26,166.

At the end of 1948 West Penn was serving 259,860 residential customers of whom about 15,000 live on farms. Their average use of service for the year was 1,672 kwhr, about 7%

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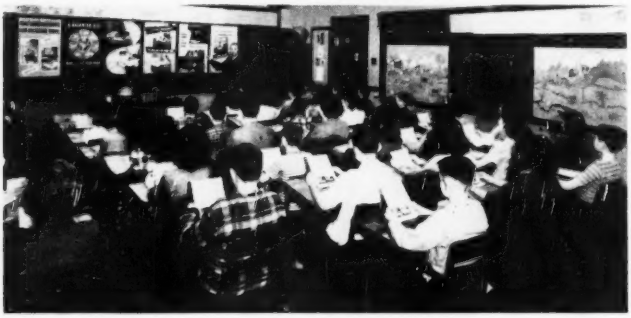
DEMONSTRATION HOMES showed modern lighting to 23,300 people



LIGHT AND SIGHT was taught in the elementary schools

IN EVERY CALL the home economist tells the lighting story

above the nation's average. The average cost of electricity to these customers was 2.99¢ per kwhr.

The sale of home lighting is promoted through the residential sales department which employs 64 people including both headquarters and field forces. The residential sales department includes the dealer section with 19 employees, home economics department with 25, electric home bureau with 12, and display section with 6. The department is served by the advertising department of the company. These forces combine in West Penn's three-way approach to the market in modern home lighting.

The first way of approach is direct to customers through group activities, individual customer contacts and advertising. The second is cultivation of channels through which the direct approach is multiplied in effectiveness. These channels are educators, architects and builders and electrical contractors. The third way is stimulation of the 500 lighting equipment dealers to greater sales effort.

Important in the direct approach activities is the use of demonstration homes in which every aspect of planned lighting is incorporated. Certified lamps are exhibited and identified in these homes. West Penn home economists serving as hostesses explain the benefits of planned lighting and of CLM lamps. Visitors numbering 23,300 inspected five electric homes in which West Penn cooperated with architects, builders and suppliers, furnishing lighting and wiring layouts. It assisted in display of features and furnishings and prepared or guided all publicity and promotion. PL and CLM were plugged in descriptive booklets, newspaper advertising and radio publicity.

An important group activity is cooperation with women's clubs and societies and youth groups. West Penn home economists work in suggestions on home lighting in the programs. Attendance at 166 group meetings of these kinds totalled 9,800. Another activity is exhibition of lighting equipment at community fairs and other displays; 43,000 people saw certified lamps in seven such affairs.

Home Economist Helps Too

Face to face discussions on home lighting improvements are the work of the home economist. On range calls and all other visits to customer's homes, lighting changes for utility and beauty are suggested. When asked for specific suggestions economists leave the "Sunshine Home" fixture schedule. When requested in homes or at West Penn offices, complete lighting and wiring layouts with recommendations are submitted.

The mass market is hit with mass advertising in eight different ways:

1. *Home Making Today* is mailed into the homes of over a quarter mil-

lion customers four times a year. Every issue tells a lighting story.

2. Twelve lighting advertisements in a year, one each month in the 67 daily and weekly newspapers in the territory.

3. Fifty-one lighted billboards carry month-long postings on certified lamps four times during the year.

4. Window displays in 47 company offices with 4 monthly trims on lamps and lighting.

5. Truck signs, miniatures of billboards, on 225 company trucks 4 months of the year.

6. Postcard bills to more than 250,000 residential customers carry CLM messages four times during the year.

7. Postage meter inserts on outgoing mail.

8. Car cards in 83 street railway cars, 4 postings on certified lamps.

Scatter Gun and Rifle Shot

Additional to the scatter gun advertising, rifle shot promotion to individual customers by direct mail is also employed. New residential and farm customers are coming on the lines of the company at a rate of 12,000 per year. Every new home builder in the territory is sent a letter from the local district manager offering suggestions on electric service and planning assistance. This is followed by a series of weekly mailings including planned lighting booklets. New customers resulting from line extensions who are wiring their homes initially are sent a different letter and a similar booklet.

Important in the second way of approach is the utilization of company employees, of whom some thousand or more have been turned into planned lighting pushers. All field personnel—office clerks, service men, meter readers, etc.—were told the planned lighting story with demonstrations by home economists. Certified lamps were exhibited and explained. These meetings were held on company time.

The planned lighting story was presented at workshop sessions sponsored by West Penn for county home making advertisers of the public school system, and for representatives of the parochial schools. In addition this group was taken to Nela Park for the one-day home lighting course. The story was presented at special workshops for home extension workers at Pennsylvania State College, Division of Agricultural Extension. Each worker was given practically a young library on light, seeing, lamps and lighting. This included copies of nine pamphlets on lighting such as *Light Is What You Make It, Teaching About Light and Sight, Recommended Practice of Home Lighting.*

Schools Take Program

Another series of workshops for home economics teachers at the county level was started in the fall of 1948 with planned lighting playing a large part in the program.

During the year West Penn personnel discussed the modernization of home-making departments with the 120 schools in its territory that have such facilities. Specifically the company counseled on layout, making lighting and wiring plans when requested. The company arranged with distributors to make certified lamps available at a special price on an annual replacement basis. It aided schools in publicizing remodeled departments by furnishing photographs and guiding the preparation of booklets.

The *Program for Teaching About Light and Sight* was sold to 20% of the grade schools in the company's service area. The teaching program was presented to a total of 260 school superintendents and supervising principals in a series of 10 meetings. One-third of the fifth and sixth grades' enrollment in the territory enjoyed the program in the past school year. All the schools represented bought the materials directly from the Better Light Better Sight Bureau.

Enlisting the aid of architects, builders and electrical contractors was done in 4 ways:

1. Personal contact through the company's electric home bureau staff with every architect and builder in the territory.

2. Close personal touch with many of the 375 full-time electrical contractors operating in the area.

3. Sponsoring a Nela Park trip for electrical contractors.

4. Including planned lighting plugs in regular mailings to architects, builders and contractors. Special mailings and emphasized planned lighting values.

Monthly *Wiring Bulletins* and special issues were sent to 375 full-time electrical contractors and 300 part-time contractors, carrying forceful messages on planned lighting benefits.

West Penn mails 1,250 copies of *Electricity in Building* monthly to the building interest groups. Last year three issues carried planned lighting stories and pictures. The planned lighting presentation *How To Put More Value* was given complete distribution among building interests in the territory, 1,200 copies.

Enlisting the Dealers

The third way of approach, stimulating lighting dealers to make planned lighting sales, included the following activities:

1. Training dealers and their employees.

2. Providing display materials and assistance.

3. Arranging dealers' displays on company office floors.

4. Sponsoring a local lamp show for dealers.

5. Keeping dealers in touch with supply sources of lamps and lighting equipment.

6. Making lighting specialists available for dealer shows.

7. Encouraging dealers to advertise lamps and to tie in with West Penn lighting advertising, providing free mats. Also offering addressing service for dealers' direct mail.

8. Providing material for continuous education of dealers through a publication, *Contact*, directed specifically to them.

The company trains dealer personnel by conducting training sessions in dealers' showrooms using stock CLM lamps as demonstrators. A booklet containing the CLM lamp story reprinted from the *Magazine of Light* was reviewed with sales people and left with them as a training and reference piece.

The company provides display material and assistance. To dealers who would create a lamp department, assign suitable lamp display space and purchase a minimum of CLM adver-

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DEALER SALES PEOPLE are instructed on features of modern lamps

tising helps, West Penn furnished the CLM cutaway display background, lent for a limited time a projection light meter and lent a device for properly positioning two floor lamps to prove the CLM superior performance. Any dealer purchasing a projection light meter was given the positioning device to keep.

To dealers who would put in certified displays on their floors or in their windows, the company furnished the CLM cutaway background and billboard miniature and offered display suggestions when necessary. Also, the company made available at cost the CLM booklets and leaflets. Dealers bought 3,000 copies of *Your Certified Lamps* and 36,000 copies of the *Certified Lamp leaflet*. The dealers' lamps were displayed in company offices. One dealer even took large newspaper advertising space to publicize the showing of his merchandise in company showrooms.

The company keeps dealers in touch with supply sources of lamps. The nineteen dealer representatives have up-to-date information on available supplies of lamps and lighting equipment. They aid dealers in keeping stocks of lamps filled by putting them in touch with producers. In addition, the company prints a buyers' guide in its dealer publication *Contact*. West Penn home economists demonstrated CLM lamps to dealers' customers at specially advertised showings in dealers' stores.

Dealers are encouraged to run their own advertising on notification of insertion dates of West Penn advertising and urged to tie in. In many cases dealer representatives of the company were able to get several dealers to co-operate in a large display of certified lamp advertisements.

Lamp lighting and certified lamps are consistently plugged in *Contact*. Lighting trends, new equipment campaigns, sales aids, dealers' activities, all are reported in this widely accepted organ which is mailed monthly to all dealers in the company area and to Pittsburgh distributors of lamps and lighting equipment. The result of this dealer activity was that during a year in which major appliances and household furnishings became more readily available and were sold in increasingly large quantities, dealers maintained their volume on lamps and lighting equipment with a gross business of $2,240,000. This was more than 8% of the total dollar volume of their electric appliance business. They sold 128,000 pieces of lighting equipment. Portable lamps make up one-half the number of items and represented 72% of the dollar value. Dealers took time to launch successfully the newcomer on the stage, the certified lamp. Of all portable lamps reported sold, 8.2% were CLM, a good first full year start.

To sum up, the first way of approach to the residence lighting market exposed a solid proportion of the company's customers to the better home lighting story through group activities which reached 76,100 people: through residential advertising, 30% of which plugged lighting and CLM lamps; through newspaper ads, direct mail, billboards, displays; and through direct contacts, personal or mail, with live prospects.

The second way of approach multiplied the company's own sales efforts by selling educational authorities and home-making teachers, by getting 20% of grade schools to buy the teaching about light and sight programs and use this the full year; by educating and enlisting the aid of architects, builders and contractors.

The third way stimulated 500 lighting dealers to maintain a high volume of lighting sales, $2,240,000 gross business; to introduce the certified lamp and establish its acceptance by the public.

General Electric Photo

"A POLICEMAN'S LOT IS NOT A HAPPY ONE," but modern street lighting can do much to ameliorate it

How to Sell Street Lighting

Public must be educated to the need for protection against accident and crime, then shown how to secure such protection

EDMOND C. POWERS
The Street and Traffic Safety Lighting Bureau

BEFORE EMBARKING on the theme of "How to Sell Street Lighting," it is much worthwhile to dwell a little on why street lighting should—must be—sold. Let us glance briefly at the electrical picture of the nation and see how street lighting figures in it. The electrical industry has reason to be proud of what it has accomplished in this country.

A proud record, indeed. In the 20 years, 1929-1949, per capita use of electricity in this country rose from 611 to 1,615 kwhr. increased 165%. The per capita bill for electricity increased also, but not nearly so much, only about 90%, from $15 to $28.40.

But the record for use of electricity in street lighting is not such a proud one. The per capita figures at the beginning and end of the period are practically the same, 16.6 and 16.9 kwhr. And the per capita street lighting bill dropped from 72¢ to 55¢, a decrease of 23.6%.

And while street lighting was chalking up this sorry record, population of the country increased 21% (123,000,000 vs. 149,000,000) and motor vehicle registration rose from 26,500,000 to 40,600,000, an increase of 54%. More people available for killing and maiming on poorly-lighted streets and highways, more motor vehicles to do the grisly work.

For the failure of street lighting to keep pace with the general advance of electricity use in the past two decades there are no sound reasons or excuses. Municipal and other local governments could not afford much money for street lighting improvement in the depression '30's; street lighting equipment was unobtainable during the war years. The figures of electricity use for street lighting are misleading because they do not take into account the improvement in efficiency of light sources and of light application. The drop in per capita bill for street lighting was partially caused by rate reductions. These alibis add up to nothing more than the simple explanation that local governments, electric utilities, and the general public have neglected street lighting to an appalling degree in the past 20 years.

It is cheering to report, however, that the national condition of inadequacy in street and highway lighting is now getting attention and that progress is being made towards its correction. It has been estimated that

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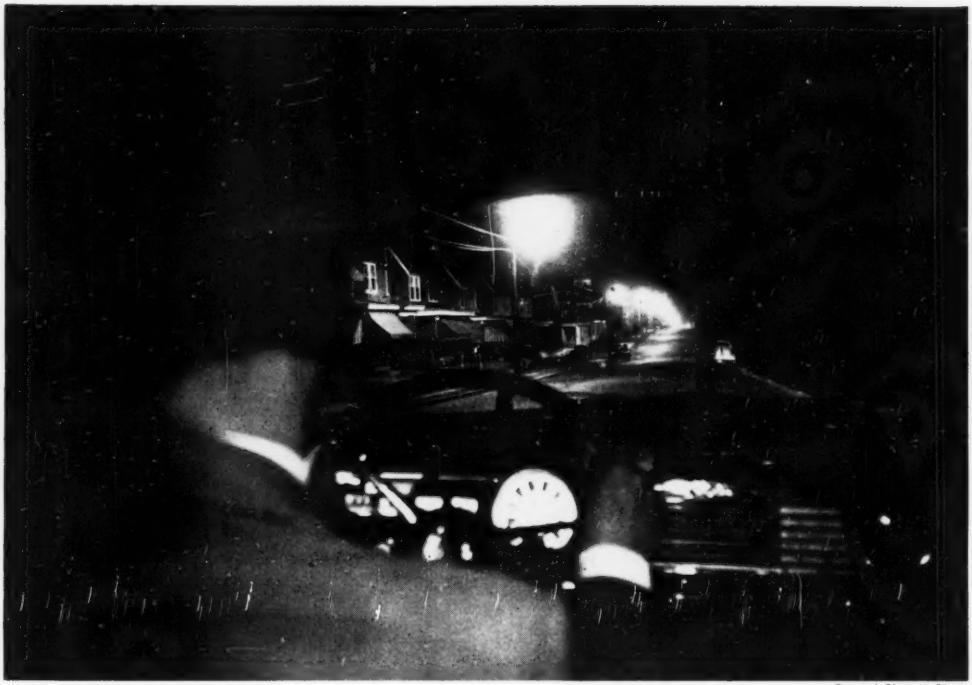


General Electric Photo

MODERN STREET LIGHTING eases the strain of night driving and enables the motorist to see and avoid danger in time to save a life

about 4,000,000 new luminaires at an installed cost of around $500,000,000 are needed to modernize the lighting of America's streets and traffic ways. These estimates were compiled from various survey data and from interviews with municipal and utility officials over the nation. Some of that $500,000,000 is being expended now, maybe 15% of it. Programs already under way add up to around $75,000,000. Here are some of them:

New York	$20,000,000
Chicago	15,000,000
Cleveland	9,000,000
San Francisco	4,300,000
Detroit	4,000,000
Seattle	4,000,000
Kansas City	2,000,000
Buffalo	2,000,000

Although a good start has been made, it is still only a start and much remains to be done to get the movement towards adequate street lighting really rolling. The industry-supported Street and Traffic Safety Lighting Bureau is spearheading the job at the national level. The National Safety Council is lending effective aid, as are also other industry and business associations. But these organizations can only make general plans, provide publicity, and some materials. The job to be done is almost wholly in the area of city and utility action. The selling job must be done at the point where lighting and relighting decisions are made, and funds appropriated. It is a local selling job. It is the purpose of the reminder of this article to tell how that job can be done.

* * * *

SELLING the modernization of street lighting is, in the final analysis, a job of molding public opinion and of causing that opinion to become vocal, thus to produce the desired action on the part of public officials. The arousing of public opinion against toleration of poorly lighted streets is the principal selling task.

This can be accomplished by giving as wide publicity as possible to the inadequacy of the existing lighting; and by emphasizing the inadequacy to those parts of the public most affected by the poor lighting. It is to such groups, and to the individual members of groups, that the campaign of selling street lighting must be specifically directed.

Each group must be educated along the lines of the selling campaign. Each individual must be made aware of the benefits to be derived from street lighting improvement. The object should be to convince as many persons as possible that an improved lighting system is a vital necessity. Working on this level assures a strong foundation of crystallized public opinion, out of which arises the civic movement demanding the improvement.

Solidification of these educated groups will bring about the final action. The public, which consists of both the groups and the individuals, should state its demands in petitions and letters to the city council and mayor or city manager.

The advantages of adequate, modern street lighting are the campaign's main promotional points. A survey, prepared by the Street and Traffic Safety Lighting Bureau, presented to the President's 1949 Highway Safety Conference proved statistically that 10,000 lives are lost each year in traffic accidents caused by poorly lighted streets and thoroughfares. Visibility is so inadequate that motorists are unable to see fatal dangers in time to save their own lives and the lives of others!

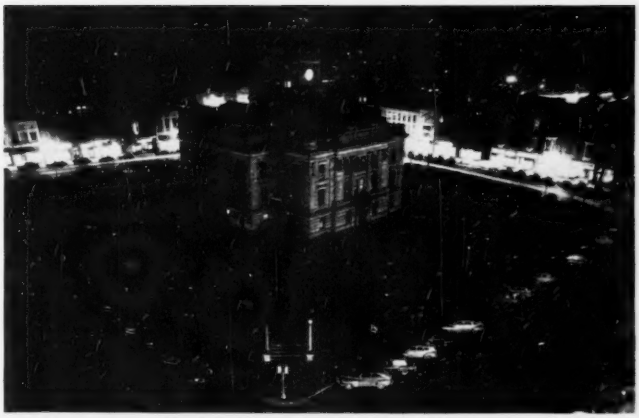
That crime goes up when the sun goes down was another conclusion drawn by the Bureau after an extensive survey of police and crime authorities. Purse snatchings, rape and felonious assaults are four times as prevalent at night as during the day, with the ratio going as high as ten to one in some areas, the Bureau's tabulation showed. "Crimes which occur more frequently at nighttime", says J. Edgar Hoover, Director, Federal Bureau of Investigation, "are most common in areas lacking adequate street lighting facilities."

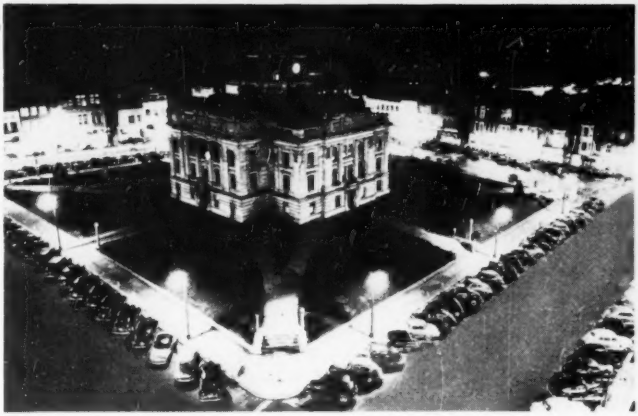
Cities that have relighted some of their streets report that modernization produces other benefits in addition to saving lives, reducing property damage and curbing crime: 83% say it improves business; 78% say it increases property values; 96% say it promotes civic pride; 96% say it enhances the city's prestige.

The individual must be made aware of these advantages to be gained. That is the selling job. Through his action, whether it be a letter to the editor of his newspaper, or a direct approach to the city fathers, is gained the ground leading toward the sale of street lighting.

The basis for forming public opinion lies in communication. Underlying all social progress is the transfer of ideas between individuals. The active campaign of selling street lighting should use every means of communication available: the printed word, the spoken word, and the visual word.

Local newspapers, articles published in local magazines, bulletins from groups to their members, paid advertising, posters, billboards, are effective media for informing and arousing the public.





THOUSANDS OF FOLKS from the surrounding countryside trooped in to join with Bloomington, Indiana, residents in celebration of the turning-on of the new street lights

Speeches are particularly effective. Lecture material can be furnished appropriate speakers for addressing civic minded groups. Material can be circulated for church sermons. Radio round-table discussions can be held.

For visual communication, neighborhood theatres can be utilized. Television could be used for dramatic showings of automobile accident pictures and the dramatic contrast between good and poor street lighting. Pictures in newspapers command extremely high reader interest.

No medium should be overlooked. Every means of communication has its definite place. If the individual is not reached by one approach, he will be attracted and influenced by another.

Experience has shown that the local crusading newspaper is a powerful force in molding public opinion. But newspapers cannot create news, they can only report it. The street lighting salesman should set himself up as a source of information. He should be the outlet from which information can be obtained by the newspapers. A civic minded editor convinced that a good street lighting system is a necessity will launch a public-spirited campaign. The salesman should stand in the background of such a campaign and act only as a source of information.

The program should be mapped to reach the lowest echelons, starting with the group, then enveloping the public. It is on the group level where

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LARGER LAMPS, mounted higher, characterize modern street lighting design

MODERN PENDANT LUMINAIRES put more light on road surface

the campaign would be most active, because it is at this level that the actual movement will originate. The demand for adequate street lighting will come from the people. That is our system of government.

In a sense, all groups are interested groups. The passengers on a street car are a group. They become an interest group when they express some grievance in respect to the service. When such an association is formed, either designedly or spontaneously, the attention of both the group membership and of outsiders is turned upon the common interest, particularly when it is given publicity.

Women's groups, especially, are impressed by a campaign which brings out the benefits of modernized street lighting. Most women's organizations have some direct or indirect interest in political functioning, in influencing legislation, and in attempting to mold public opinion. Speeches, movies, lectures, and all sorts of printed material directed at these women's groups have a definite effect in forming opinion against poorly-lighted streets.

Such organizations as the Federation of Women's Clubs, the League of Women Voters, American Legion Auxiliary, women's church organizations, YMCA Mother's Clubs, Health Council Agencies, Parent-Teacher Associations, Music and Drama Groups, Public Affairs Committees, and the National Women's Party are particularly active and influential in the public's welfare. These are but a handful of the more than 3,000 such organizations existing today, all ready and willing to aid in any program which will eventually bring benefits to their members.

In approaching these groups, the safety advantage of good street lighting can be used. Statistics on the decrease of after-dark automobile accidents and other benefits of improved street lighting are available from the Street and Traffic Safety Lighting Bureau.

On the same line of approach, civic clubs become another point of attack. Using the same methods of communication, the benefits of adequate street lighting can be explained to the business man. Kiwanis, Rotary, Lions, Junior Chambers of Commerce, all have their places in civic movements. Organizations of this type usually can be approached on public service programs. Church organizations reach large portions of any community. Here, again, every medium should be used to form the opinion needed to promote a civic cause.

Under democracy, like-minded individuals gather together in reform organizations. Such groups are preoccupied with some aspect of what they consider general welfare, not with furthering self-interests. They are in perfect position to influence the citizen with regard to increasing safety after dark by modernizing street lighting. Approaching such a group through lectures, pamphlets, movies, etc, brings to the front the urgency of improving street lights.

A program of this sort carried on through all media and reaching all individuals is the only possible way to sell the large program of street lighting improvement. Since the installation of a street lighting system would eventually stem from a local government, as many persons as possible should have a voice in it.

The average citizen takes the functions of his governing agency for granted. He expects to see the policeman walk his beat, and the fireman come when called. By the same token, he expects adequacy in street lighting. But he does not know what adequate street lighting is. He must be taught what it is and told what he is losing by not having it. He must be made to want it and to work towards it in a crystallized public opinion.

Selling street lighting is selling safety, security, prosperity, and civic pride right back to the individual. It is not product or service selling, but rather the activation of an existing desire and showing how that desire can be satisfied. Such is the case with street lighting. Every man wants his family safe at night in the streets and at home but he will not act toward securing the safety of adequate street lighting until he is aroused to the evils of neglect.

Selling good street lighting is selling a fundamental need. It is only through education of the people to this need that any campaign can achieve maximum success.

IMPROVED TRENCHER digs very narrow trench to a depth of 42 in.

Experience With Buried Cable On Rural and Transmission Circuits

Operating records on 175 miles, totalling 1,000 mile-years of experience, indicate that the additional cost is justified by reduction of service interruptions—Improved fault location, new equipment aid progress

A. D. CASKEY
Electrical Engineer

C. A. JAQUES
Asst. Electrical Engineer
Public Service Co of Northern Illinois

PRESENT practices in installing buried cable on the Public Service Company of Northern Illinois system are based on experiences of plowing-in more than 160 circuit miles in the past 12 years. Installation costs have been reduced to where currently they are less than half of conventional underground and are about one and one-half to two times that of overhead. Operating and maintenance costs are comparable with the conventional underground system. Operating experience gained with the more than 1,000 mile-years of service have shown a marked reduction in failures–from 39.0 per 100 mile-years on early installations to 4.25 on recent projects. Practices developed are a direct result of the know-how gained from the early installations. Reduction in failure rate resulted from improvement in cable design and new installation methods developed through experience and study on early jobs. Development of improved methods of locating faults accelerated progress on the buried-cable type of distribution.

First installations of rubber-insulated concentric cable were made in 1936 on rural lines where conditions were less favorable for overhead con-

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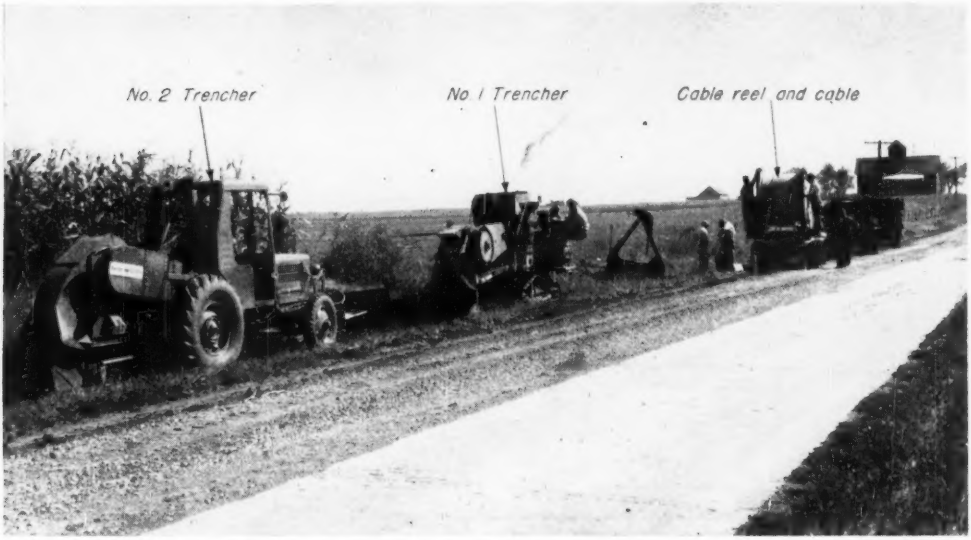


FOR HIGH VOLTAGE CABLE two trenching machines were used, one to dig for a depth of about 18 in. followed by the second which dug an additional 24 in. so that final trench was 42 in. deep. For this type of installation cable was laid out along trench ahead of trencher and lowered by hand into trench. A follow-up shoe behind the trailer scrapes the backfill into the trench and over the cable

struction. Pleasing results led to installations in built-up residential territories and its application has now been extended to urban distribution. Very recent applications of buried cable without conduit have included transmission installations.

Select First Cables

Low cost, ruggedness and durability of insulation were of prime importance in selection of the initial cables. Cable selected consisted of a No. 6 solid inner conductor insulated with a $\frac{6}{64}$-in. wall of moisture-resistant, mineral base, rubber insulation, protected by one outer friction tape. The insulated conductor was covered with a spirally-wound outer conductor of seven No. 14 tinned copper wires with no other coverings. Purchase price was 7¢ per ft. f.o.b. factory.

First installations were plowed-in with a special cable plow rented from one of the cable manufacturers. The ground was frozen, soil conditions were very bad and numerous rocks, tree stumps, etc. were encountered. When obstructions were hit, the plow raised out of the ground and the cable was not placed at uniform depth. Nevertheless, approximately 3½ miles of cable were placed in service before the end of the year, 1936.

Distribution transformers were supplied by looping the cable up and down transformer poles through a disconnect switch. The cable was terminated by unwinding the neutral wires for about 14 in., unwrapping the friction tape to expose at least a 10-in. length of bare rubber insulation and training the neutral wires away from the cable by twisting them together into one conductor.

By the end of 1937, a total of 15 miles of cables had been installed using eleven different types of insulating compounds furnished by seven manufacturers.

Operating results for the first 15 months were quite discouraging, there having been 8 cable, 3 joint and 3 terminal failures. Analysis of the failures revealed the trouble to be due to the following causes:

(a) One friction tape over the insulation under the outer wires did not provide sufficient mechanical protection and cushioning effect to the insulation. There were several cases of failure which were the result of the neutral wires being forced into the insulation where the cable lay against a rock or other obstacle.

(b) Some of the insulating compounds were not satisfactory for operation on the 4,160-v system. Corona cutting developed at the point where the outer wires were trained away from the cable at terminals.

(c) The insulation in most cases would not withstand the effects of sunlight or the elements.

(d) Cables were not laid deep enough and were consequently vulnerable to being dug into or snagged by farmers' plows.

(e) Several failures were due to damage suffered by the cable during installation because of the adverse conditions under which the original cables were installed.

Change Cable Design

As a result of the poor operating experience with earlier installations, the majority of which was due to unsatisfactory compounds, a complete change-over was made in 1939. This change was to cable having the more expensive oil-base, ozone-resistant rubber insulation with additional

wrappings or coverings over the insulation to provide better mechanical protection.

Cable now being used has an oil-base, ozone-resistant insulation and non-conducting Neoprene jacket over a tinned copper inner conductor with the concentric tinned copper wires spiralled around the outside. Two sizes are used, No. 6 and 1/0. The No. 6 cable is made up with $\frac{9}{64}$-in. insulation, $\frac{3}{64}$-in. Neoprene jacket, and seven No. 14 outer wires. It is purchased in reel lengths of 2,500 ft. The No. 1/0 consists of 10/64-in. insulation, $\frac{3}{64}$-in. Neoprene jacket and twenty No. 14 outer wires and is purchased in reel lengths of 1,500 ft.

Improve Trenching Machine

Improvements were also made in installation equipment. Cables are now being installed by means of a special trenching machine which has a chain bucket arrangement. The trench dug is 4 to 6-in. wide and the machine is capable of digging as deep as 42 in. The normal depth of burial is about 30 in. It is felt that the highest obtainable degree of protection comes from placing the cable deep enough in the ground where it will be unlikely that any normal digging, tiling, plowing and other work will interfere with the cable.

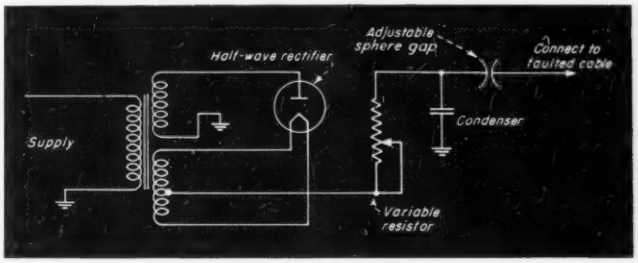
The cable follows behind the trencher on a special trailer on which the reel is mounted. It feeds into a tube mounted behind the chain bucket arrangement and is dropped into the trench. A follow-up shoe behind the trailer scrapes the backfill into the trench and over the cable as illustrated.

Where the territory is open and it is not necessary to move from location to location, it is possible to install up to 5,000 ft of cable in an 8-hr day. An average day will run in the order of 2,500 ft which is one reel length for the No. 6 size.

An analysis of several jobs indicates that the present cost of a buried concentric cable installation in rural areas ranges in cost from about 1.6 to 2 times the cost of an equivalent overhead circuit.

At present there is in service approximately 162 miles of concentric cable on strictly rural line, comprised of 147 miles of cable with the better grade insulation and 15 miles of original cable still in service on the underground portion of the earlier installations. There have been only 4.25 failures per 100 mile-years on cable with the oil-base, ozone-resistant rubber insulation compared with 39.0 failures per 100 mile-years on original cables with mineral base rubber insulation.

There have been no insulation failures in cables with oil-base, ozone-resistant insulation. The failure rate of these improved type concentric cables is as good or better than conventional lead covered cables installed in a conduit system. Detailed records of all failures since the use of this type cable was started in late 1936 indicate the distribution as to cause (see table below).



SCHEMATIC DIAGRAM of fault locating equipment which makes it possible to locate faults, practically by walking to them. This compact instrument can be carried by one man

Fault Location

Location of faults was, at first, somewhat of a problem, particularly where there was only one cable on the circuit. New equipment has been developed in the industry which reduces the finding of a fault simply to a case of walking to it. The equipment shown in the circuit diagram consists essentially of a rectifier and condenser with an adjustable air gap, one side of which is connected to the conductor of the faulted cable and the other side to ground through the condenser. The condenser builds up and discharges across the air gap at about one second intervals impressing a high voltage steep-front wave impulse on the cable. This impulse discharges to ground at the fault in the cable, causing a loud report which in most cases is audible up to a distance of 50 ft from the fault. For

Number of Failures

Year	Approx. miles in Service MB	Approx. miles in Service OB	Mechanical Damage MB	Mechanical Damage OB	Unsatisfactory Compound Cable MB	Unsatisfactory Compound Cable OB	Unsatisfactory Compound Terminal End MB	Unsatisfactory Compound Terminal End OB	Lightning MB	Lightning OB	Faulty Workmanship MB	Faulty Workmanship OB	Other MB	Other OB	Total MB	Total OB	Total
1937	15	0	5	0	1	0	4	0	1	0	3	0	0	0	14	0	14
1938	22	16	3	0	3	0	6	0	1	0	0	0	1	0	14	0	14
1939	22	25	0	3	5	0	4	0	0	0	0	0	2	1	11	4	15
1940	22	35	4	2	0	0	9	0	0	0	0	0	0	2	13	4	17
1941	22	58	0	0	6	0	0	0	0	1	0	0	0	0	6	1	7
1942	22	63	0	0	1	0	0	0	0	0	0	1	0	0	1	1	2
1943	22	68	0	0	0	0	0	0	0	1	1	0	0	2	1	3	4
1944	22	70	1	1	1	0	0	0	0	1	0	0	0	0	2	2	4
1945	20	88	2	2	7	0	0	0	4	2	0	1	0	2	13	7	20
1946	18	120	1	2	2	0	0	0	2	1	0	0	0	0	5	3	8
1947	16	132	0	4	6	0	0	0	1	3	0	0	1	0	8	7	15
1948	15	147	0	0	3	0	0	0	1	1	0	0	1	2	5	3	8
Totals	15	147	16	14	35	0	23	0	10	10	4	2	5	9	93	35	128

Notes: 1. MB designates original type cables with mineral base rubber insulation. OB designates improved type cables with oil-base ozone-resistant rubber insulation.
2. A terminal end is considered the portion of cable above the point where the outer wires are trained away, and, in the case of original cables, where the outer coverings were removed and the insulation was exposed to sunlight and the elements.
3. All failures due to fault work occurred in splices.
4. All failures since 1941 due to unsatisfactory compound occurred in the underground portion of the early installations still in service. (Terminal ends were replaced during 1939 and 1940 with the better grade cables.)
5. "Other" includes failures due to poor splicing materials, manufacturing defect and "Unknown."

CONTINUED ON NEXT PAGE

those cases where the report is faint, exploratory devices are used to locate the point where the impulse is discharging to ground. The equipment is very compact and can be carried by one man.

High-Voltage Cables

The high cost of conventional underground and the development of trenching equipment used for installing distribution cables of the concentric type for use in rural areas, as previously described, led to consideration of the burying of high voltage cables as ties between distribution centers.

Estimates based on the use of mechanical trenching equipment in open country with hand digging, confined to built-up areas, indicated that a 33-kv buried cable could be installed at a cost about 25% less than that of a cable of similar capacity installed in a conventional conduit system allowing a prorated conduit cost for one cable. On this basis it was decided to proceed to a limited extent with some high voltage buried cables.

The first experimental installation of this kind consisted of 12 miles of No. 1/0, 3/C, 13-kv paper-insulated lead cable between Toluca and Minonk, Illinois. This type of cable was selected because it was less expensive than an equivalent rubber-insulated cable. (Subsequent experience and changes in relative costs of these cables, however, would lead to the selection of concentric rubber-insulated cable and plans are now being made for some installations of this type.) The cable installed is a conventional PILC with the exception that it has a protective covering consisting of a ⅛-in. thick wall of semi-conducting Neoprene jacket. This jacket was provided to give both mechanical and corrosion protection. The jacket was made semi-conducting in order to minimize differences of potential between the cable sheath and surrounding earth.

Trenching Equipment

The usual trenching equipment was used to install the cable, but it was not feasible to mount the reel on a trailer behind the trenching equipment because of the weight involved and because this type of cable would not feed through the tube of the trencher in a satisfactory manner. Two trenching machines were used, one to dig for a depth of about 18 in., followed by the second trencher which dug an additional 24 in. so that the final trench was 42 in. deep.

Additional installations of this type involve approximately 15 miles of 33,000-v direct buried cable with similarly constructed 3/0 and 350,000 cir mil, 3 C, 35-kv PILC cable and 4 miles of 500,000 cir mil, 3/C, 12-kv, PILC cables.

One of the 33-kv installations is along a railroad right-of-way, and except for road crossings, all excavating is being done with trenching equipment. Another 33-kv installation is divided between open country areas where trenching equipment is being employed and towns where hand digging and pipe pushing under streets are required. The 12-kv installations consist of two cables buried in solid rock and all trenching was done by hand.

Analyses of costs of work done to date indicate that where mechanical trenching operations can be employed, the costs of the buried cable in place will be in the neighborhood of 30% less than a cable installed in conduit (allowing a prorated conduit cost for one cable); and that where a mixture of mechanical and hand trenching is required, the costs will very closely equal our estimate of 25% less.

Conclusions

The experience of the Public Service Company of Northern Illinois with direct buried concentric cables both in rural and residential areas indicates that the cost for such underground facilities is about one and one-half to two times the cost of an equivalent overhead line. Operating Records on a total of about 160 miles of cable indicate that the additional cost of such facilities are justified in certain circumstances by the reduction of service interruptions and repairs of equipment. It is anticipated that further reduction in costs can be effected so that greater advantage can be taken of the improved system conditions resulting from the installation of underground cables.

Burying cable directly in the ground has also been applied to urban, residential area distribution. This type of installation will be described in a forthcoming article.

Training for the Coming Era of Electronics

An Editorial in ELECTRICAL WORLD *July 20, 1935*

THAT ELECTRONICS will play an increasingly large and vital part in the future of the electrical industry is not questioned by any one even superficially familiar with the history of development that has taken place in this branch of the art in the last ten years. It may be expected—in fact, it can confidently be predicted—

that the utility industry will be no exception in this regard. But, how many of the technical men of the industry are prepared for this event? More particularly, how many are contributing to its coming about?

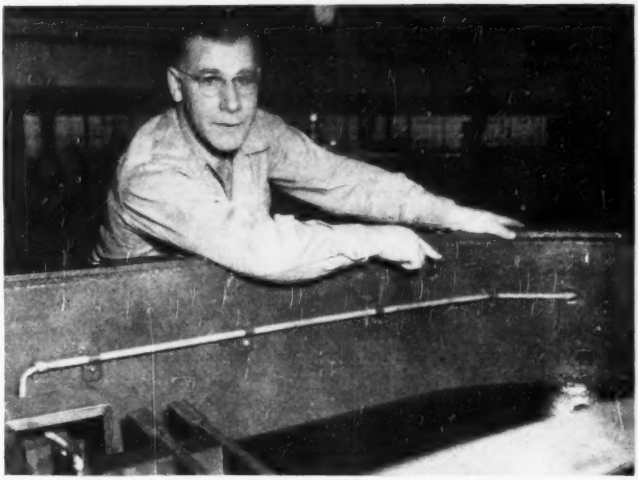
"It has been stated that the electronics will not take a foothold in the utility industry until the present generation of executive engineers passes on. We believe that this is too pessimistic an attitude. . . . . "

HOW TO DESIGN • CONSTRUCT OPERATE • MAINTAIN

Use Transformer Vent to Extend Coil Lead

EXTENSION of a feed wire through a transformer vent pipe has saved time and materials as compared to a previous method. The recommendation was made by Neil J. Doherty, a mechanic in the Astoria Transformer Shop of Consolidated Edison Co of New York Inc.

The change in the placement of the lead wire is made on 500-kw submersible type transformers. This is one of the types of transformers overhauled periodically in the shop. Most of these transformers were originally equipped with ground switches without electrical interlocks. As a result this condition had to be remedied whenever they were brought to the shop for overhauling.



VENT PIPE is indicated through which feed wire is extended. Lead runs from a phase bus in the transformer tank to an interlock coil on a ground switch

Old Method of Wiring

To provide the interlock coil with operating current a feed wire had to be extended from a phase bus in the transformer tank through the transformer and primary walls to the interlock coil. To make this possible holes were drilled through the transformer and primary walls. A length of steel pipe fitted with a special bushing and stud was inserted through these holes and welded into place. The feed wire from the phase bus to the interlock coil was extended through the bushing inside the pipe.

That work is being eliminated by extending the feed wire through an existing vent pipe between the transformer tank and the primary chamber. The only additional work necessary under this new method is to reinforce the wire's insulation where it passes over the edges of the pipe.

This procedure will be applied in the overhauling of all transformers of this type not already provided with electrical interlocks under the old method. On the basis of past experience it is estimated that about 40 such units will be overhauled yearly over a period of from 5 to 8 years.

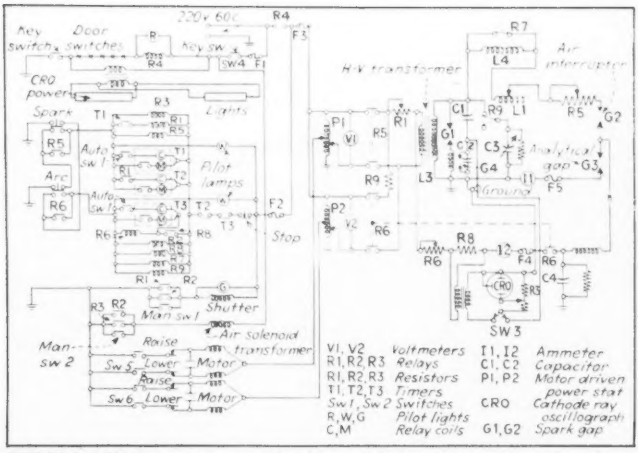
Unusual Power Pack Improves Spectrochemical Analysis

W. O. EVERLING
Director Research American Steel & Wire Co
Pittsburgh

ACCURATELY reproducible results in spectrochemical analysis are obtained from the use of a new electrical power source that provides for either the spark or arc method of quantitatively analyzing specimens in the research department of American Steel & Wire Co.

When analyzing steel samples with high alloy content, spark lines are used for calibration, using low inductance and high capacitance in the power source. High inductance and low capacitance are employed when analyzing samples with intermediate alloy concentrations. With very low alloy concentrations, arc lines are used for calibration, operating the arc source from the 220-v line with all available inductance inserted in the initiating spark circuit.

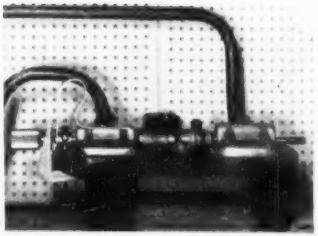
The experimental power source consists of the electrical equipment necessary to produce either a high-voltage, a-c spark, or a low-voltage, spark-ignited, a-c arc. The electrical equipment and control elements include a 3-kva transformer with a 32,000 v peak voltage. Capacitors provide a capacity range of 0.002 to 0.016 μf. Variable inductance in the spark circuit ranges from 10 to



SPECTOGRAPHIC power source provides either a high-voltage a-c spark, or a low-voltage, spark-ignited, a-c arc. Energy output is constant for a given setting of controls

40 μh. Approximately 300 μh inductance is permanently mounted in the arc circuit. A primary resistance of 11½ ohm permanently mounted, and a variable resistance of 0 to 15 ohm, are included in the spark circuit. In the arc circuit, 5 ohm primary resistance is permanently mounted, and a variable resistance of 0 to 37 ohm is provided. A secondary resistance of ½ to 9½ ohm has also been provided. Current in the spark circuit can be varied from 5 to 25 amp, while the current in the arc circuit is variable between 0 and 5 amp. The safety gap has been provided with a graduated scale to simplify adjustment. The timers provide for pre-sparking, sparking, and arcing, intervals from 0 to 120 sec.

As in all power sources, certain factors increase or decrease the energy output. After the primary resistance has been established, the



AIR INTERRUPTER is mounted in steel box lined with acoustical material

distance of the air gap (auxiliary gap) is adjusted so that the proper current (amperage) and number of breaks per half cycle are discharged in the analytical gap to provide the proper burn (avoiding deep craters in the specimens) that will give uniform analytical results from sample to sample.

For steel, the source parameters listed below have been found to be those that give the best burn (no craters) and provide readily reproducible and accurate results:

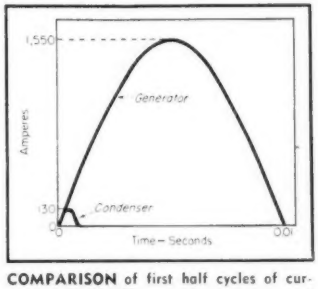
Capacitance	0.010 microfarads
Inductance	¾ turn (about 10 uh)
Primary resistance	18½ ohms
Current	19 amp
Pre-spark interval	15 sec
Exposure	10 sec
Oscillograph reading	3 (breaks ½ cycle)
Peak voltage	18,000 v
Air pressure	2.5 psi
Auxiliary gap (air gap)	.6 mm (approx.)
Analytical gap	4 mm

Condenser Supplies Power for Testing Circuit Breaker

F. O. MASON
British Electrical and Allied Industries Research Association

SOME INTERESTING results were obtained from using a condenser as a power supply for testing gas blast circuit breakers, instead of the usual high-power 6.6-kv, 10,000-kw alternator. The condenser was charged to about 10 kv, which is equivalent to peak value of a 6,600 rms wave.

In the tests, the condenser produced a damped oscillatory current of some 550 cps with a peak value in the first half cycle of about 130 amp. The condenser capacitance was 5 μf and the total inductance (equivalent to that of the alternator) was approximately 0.019, which equals 6 ohms at 50 cps. Under these conditions, the rate of change of current at the



COMPARISON of first half cycles of current supplied by 50-cps testing generator and 550-cps discharge from condenser

end of the first half cycle of current will be approximately equal to the rate of change of current obtained at zero for a 50-cps wave of 1,100 amp rms and the wave front of the restriking voltage is, for practical purposes, the same as that obtained with the alternator excited to 6,600 v.

Tests made on an experimental gas blast circuit-breaker showed that the breaker was having difficulty in clearing the circuit, although the circuit-breaker used was one that had been in constant use in breaking the 1,100-amp rms current from the 10,000-kw test alternator. It was found in fact that the task imposed on the breaker in clearing the circuit at the end of the first half cycle of arcing was of the same order as that experienced when the alternator was used as the power supply. The arc in both cases was initiated by a fine fuse wire.

For purposes of comparison, the half cycles of current shown for both the discharging condenser and the alternator are to the same scale.

The scope of the tests described is,

(Continued on page 88)

Can beauty and utility be one?...

THIS question must be faced when you consider the use of substations in residential areas where appearance is a factor.

The answer is. . . .

No. . . . when you consider "piece-meal" substations with their unsightly looks and space-consuming design.

Yes. . . . when you use General Electric *unit* substations.

This problem was solved for many utilities when G-E engineers showed them how G-E unit substations with their smooth, integrated lines—plus some incidental landscaping—would easily overcome appearance objections. At the same time the utilities realized the many benefits—such as lower costs and increased reliability—of G-E load-center power distribution.

We'd like to show you how other utilities utilized G-E unit substations. Give us a call, or write for brochure GEA-5155 that shows how you can utilize G-E engineering and service. *Apparatus Dept., General Electric Company, Schenectady 5, N. Y.*

GENERAL ELECTRIC

821-60

We consider our 97,630 kva in Capacitors—

a most worthwhile investment

PORTLAND GENERAL ELECTRIC CO.

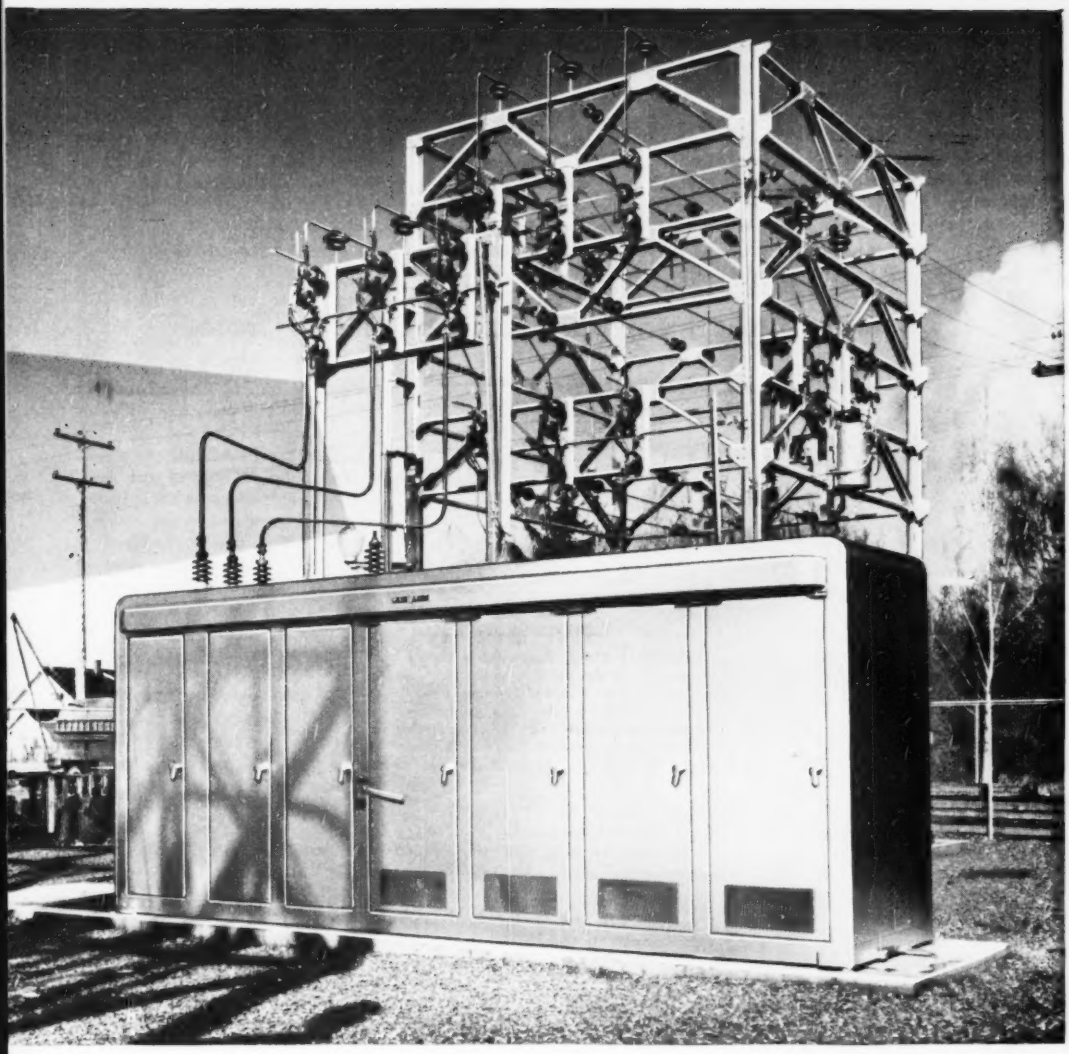
This is the story that Portland General Electric Company of Portland, Oregon tells about capacitors:

"Our interest in capacitors goes back before the war. We made some system studies at that time which indicated that, as loads increased, conditions on our distribution system should be improved. In a moderate way, we had installed capacitors to test this out—to increase system capacity and to improve voltage levels.

"This experience served the company well during the difficult war years. Heavy loads taxed system capacity to the limit. Equipment to gain additional capacity was almost out of the question, and it was only by installing capacitors that we met demands.

"Since the war, loads have continued to increase, additional capacitors have helped make it possible to meet this demand. Not only have capacitors been installed on our own distribution system but by offering a rate structure that makes capacitors an attractive investment to some industrial users we have been successful in improving the power factor of industrial loads.

"In hydroelectric areas such as ours, where large blocks of power must be transmitted over long distances, the



1620-kva capacitor equipment installed on system of Portland General Electric Company, Portland, Oregon.

generation of kilovars at or near the load is especially important.

"To date we have installed 97,630 kvar in capacitors—which, compared to our 409,000 kw peak of last December gives us a 24 per cent ratio between connected kvar and peak kw. Of these capacitors 59,380 kvar are fixed, 38,250 kvar are switched.

"Our experience with capacitors demonstrates they release system capacity inexpensively, permitting us to reduce our costs per kw delivered, they improve voltage conditions, they are installed quickly and are completely reliable. We consider them a desirable investment."

The purpose of these advertisements is to encourage electrical utilities to exchange information on the use of power-factor-improvement capacitors. We believe—particularly now when capacitor kvars are at their lowest price in history—that such an exchange will best bring out that capacitors can be used much more widely than at present—that they provide the fastest way of increasing peak-load capacity—that they can bring many utilities extraordinary returns by increasing capacity of existing distribution lines, transmission lines, transformers and circuit breakers—and that they offer one of the best possibilities of scaling down system costs per kilowatt. If your experience with capacitors would be of interest and value to other companies, we would like to hear from you. Contact your G-E Representative or write *Apparatus Dept., General Electric Company, Schenectady 5, N. Y.*

GENERAL ELECTRIC

(Continued from page 84)

of course, limited and the range of equivalence of the two methods of testing may be present only over part of the power frequency current range of certain types and designs of circuit-breaker. It is thought that these breakers (as in the case of the one used in the present experiments) will be found to be of types in which, within the appropriate range of power-frequency current, substantially all ionized products of arcing in the half cycle are swept from the gap just before current zero.

Implications of such tests include possible application to synthetic testing in which the effects on the breaker structure of the heat of the power arc and of the electro-magnetic forces set up by the full power-frequency current can be obtained. This can be done by suitable combination of the high voltage condenser discharge, near current zero, with a heavy power-frequency current supplied by a source of relatively low voltage.

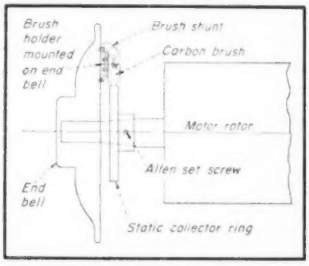
Remove Static from Pulverizer Exhauster Rotor

L. E. PLUMMER
and
E. L. STEIN, JR.
Master Maintenancemen
Tidd Plant
The Ohio Power Co
Brilliant, Ohio

BEARING LIFE was increased 100% when static electricity was drained from rotors on coal-pulverizer exhausters at Tidd plant. A collector ring-and-brush assembly provided the path to drain the static to ground.

Prior to addition of this collector, an excessive amount of static was collecting on the exhauster rotors, in some cases exceeding 500 v. Immediately after renewing the exhauster blades the static was negligible. But the voltage increased with hours of service.

The reason static collected was probably due: (1) To the friction between the coal dust and exhauster blades or (2) to electrified coal dust (particles may have become charged in the pulverizing or conveying process) passing by steel fan blades and imparting to them a charge which would build up until discharged.



COLLECTOR RING, machined to fit on motor shaft, drains static to brush and to ground. A generator collector-ring brush-holder is mounted on the motor end-bell in line with the collector ring. Collector brush (General Electric Grade H hardness) is connected to the end-bell by brush shunt

During overhaul periods of the exhausters, inspection of the rotor bearings revealed that the static charge had arced across the oil film from the journals to the bearings, burning pits in the babbit.

Remedy—To remove the static as fast as it accumulates and thereby prevent its discharging through the bearing oil film or through the airborne powdered coal, two different methods were tried:

Method 1—A steel ball was placed in the centering hole of the shaft and held in position with a spring which was grounded to the end-bell of the motor. This method proved unsatisfactory due to oil collecting on the ball and the small contact surface.

Method 2—A collector ring was mounted on the motor shaft and continuous connection with the motor end-bell maintained by a collector-ring brush (See illustration).

All of the exhausters have been equipped with this collector ring-and-brush assembly. Inspections have shown no indication of pitted bearings or journals. Based on past experiences it has been estimated that the life of the bearings has been doubled by this drain of static electricity.

To equip each exhauster with this static collector required approximately 10 man-hours and a material cost estimated at $7.50.

A Guide for Grounding Substation Metal Fences

AN ARRANGEMENT is outlined for ground conductor, ground rods and connections with relation to fence and substation ground system. This adaptation is from substation construction standards of New England Electric System, Boston, Mass.

Construction Details

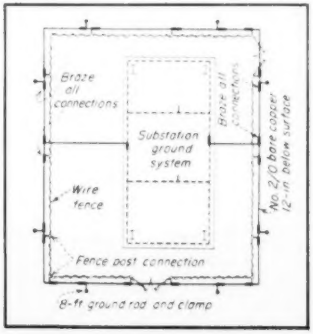
Ground rods are to be spaced not more than 40 ft and not less than 10 ft apart.

Connect ground rods with 2/0 bare copper wire located 12 in. outside fence and buried approximately 12 in. below surface. When fence is on or less than 13 in. from the property line, ground wire should be located on property line.

Always tie substation and fence ground grids together using not less than two connections equally spaced.

This standard applies to routine substation enclosures.

For connections at fence posts, use cup washer and ⅝-in. galvanized bolt. Install washer and riser connection on substation side of fence post.



what's **New** in street lighting

Constant Current "Substation" — cuts installation costs by 2/3

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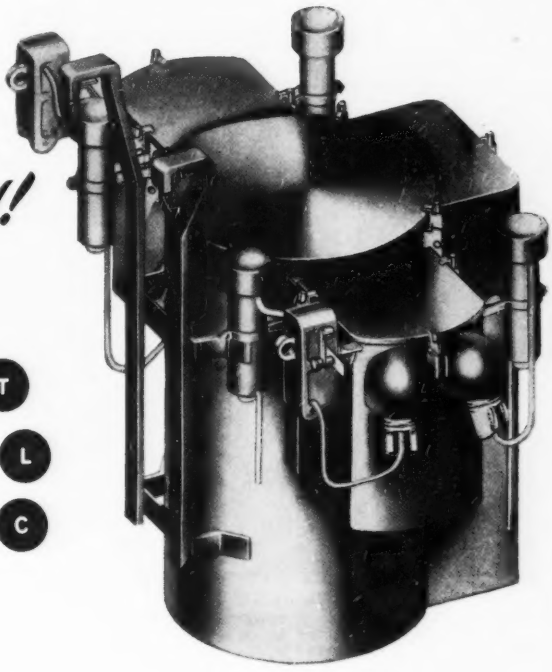
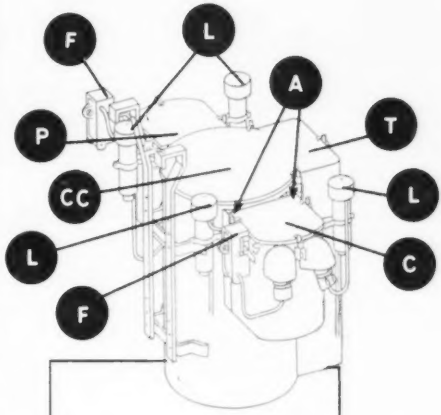
Bolt it...
Connect it...
it's installed!





CC—Constant-Current Transformer
C—Controller
P—Protector
T—Capacitor Tank
L—Lightning Arresters (Pellet type)
F—Fuse Cutout
A—Air shaft for cooling

This new General Electric outdoor substation-type constant-current regulator has all of its component parts interwired at the factory. In the field it is only necessary to bolt it on the pole or platform—connect the power and control leads.

And it saves on maintenance too. All components are in one location, yet each is readily accessible—in its own separate compartment—in its own oil. Any one component may be serviced without disturbing any other part.

And it's safer—the fuse-cutouts are located where they give positive visible assurance that the circuit is open. For complete details write *Apparatus Dept., General Electric Company, Schenectady 5, New York.*

GENERAL ELECTRIC

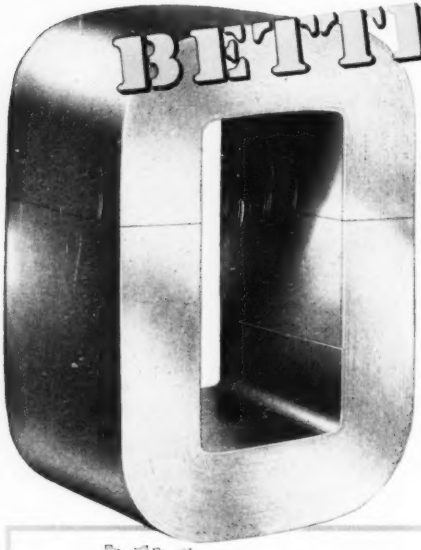
THE *NEW* MOLONEY

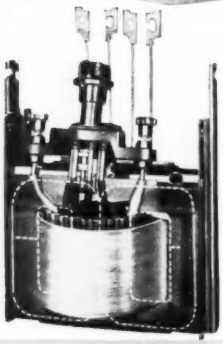
*HiperCore**

DISTRIBUTION TRANSFORMERS

*CORES MADE OF HIGH PERMEABILITY, ORIENTED, SILICON STEEL

BETTER VOLTAGE





Dotted line in illustration at left, indicate position of core in assembled core-and-coil unit. After cores are wound, they are annealed, impregnated and then cut into pairs of U-shaped pieces. Two large U-shaped pieces are placed side by side, forming an inner and two outer core legs. Then the windings are placed over the inner core leg. Next, the two matching U-shaped pieces are placed into position to complete the magnetic circuits. A thermo-setting adhesive bonds the core faces together.

BETTER VOLTAGE REGULATION AT ALL LOADS

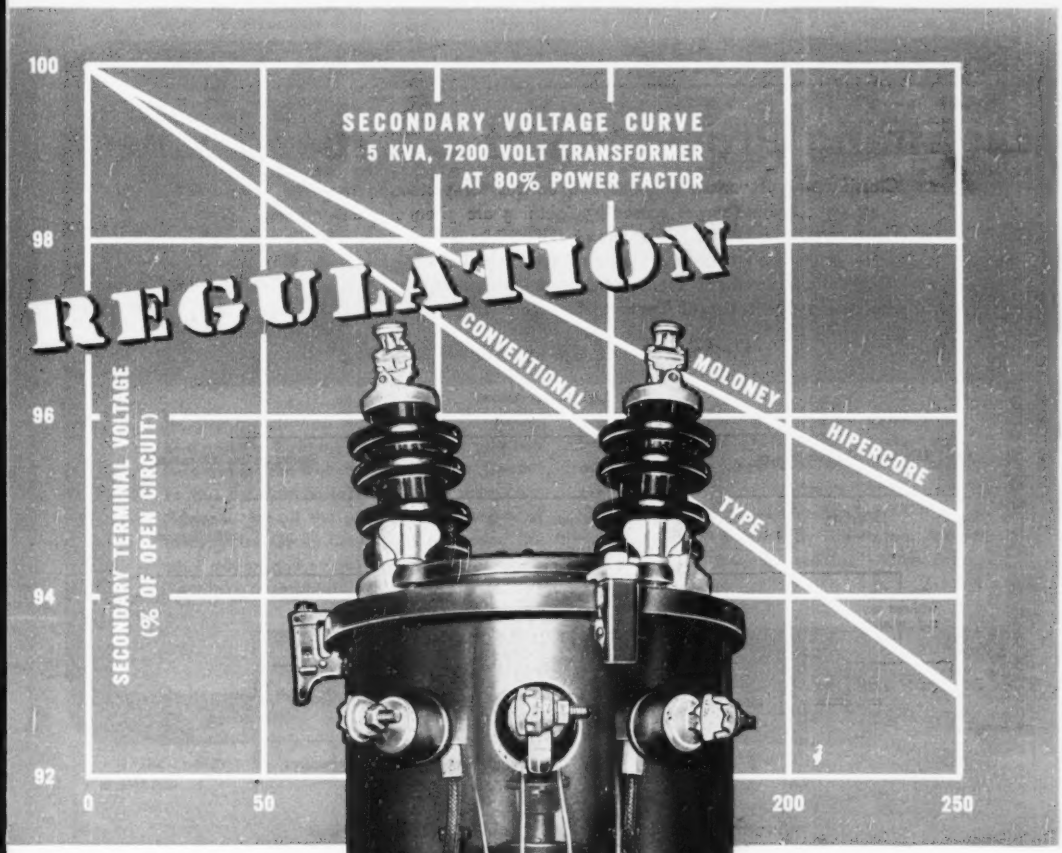
Development of the new Moloney HiperCore Transformer has made possible a reduction in transformer impedance, resulting in better voltage regulation. These wound core transformers, being smaller physically, have inherently lower impedance than transformers of conventional core design.

Better voltage regulation means better all-around system performance. Secondary voltage fluctuations, due to sudden or intermittent load changes, are reduced. Secondary voltages may be maintained at a higher level resulting in improved performance of the connected load.

In many installations emergency loading is controlled largely by transformer voltage regulation. Moloney HiperCore Distribution Transformers, having better regulation, can carry higher overloads with the same permissible voltage drop.

MOLONEY

SALES OFFICES IN ALL PRINCIPAL CITIES • FACTORIES AT

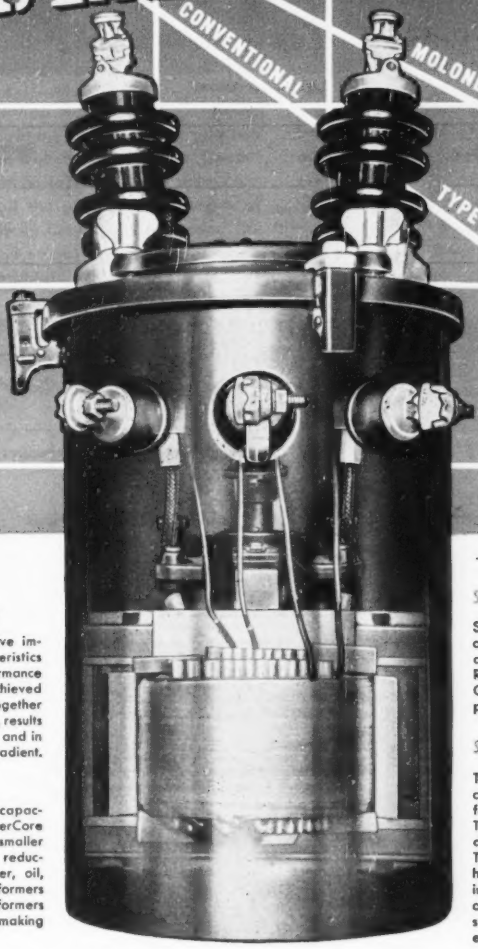


GREATER SHORT-TIME OVERLOAD CAPACITY

Moloney HiperCore Transformers have improved short-time overload characteristics which provide better peak load performance and longer life. Reduced coil mass, achieved through use of oriented steel cores, together with the extensive use of cooling ducts, results in more rapid cooling of the windings and in a lower hottest-spot temperature gradient.

LIGHTER WEIGHT

The 30% to 35% higher flux carrying capacity of the oriented core steel used in HiperCore Transformers makes possible the use of smaller cores and windings, with consequent reductions in the weights of steel, copper, oil, and other materials. HiperCore Transformers weigh 15% to 30% less than transformers having cores made of hot rolled steel, making them easier to handle and install.



SMALLER SIZE

Since the higher flux carrying capacity of oriented steel permits the use of smaller cores and windings, smaller tanks can be used. Reductions in size range up to 30%. HiperCore Transformers take up less space on the pole, in the storeroom, and on the line truck.

SUPERIOR TAP CHANGER DESIGN

The "snap action" movement of the tap changer used on Moloney HiperCore Transformers assures positive pressure at all times. The handle is above the hot oil level and the dial can be read from the handhole opening. The body of the tap changer is made of high-impact-strength phenolic resin for high insulation and elimination of breakage. Use of high contact pressure and oversize contact surfaces insures low temperature rise and eliminates pitting or burning.

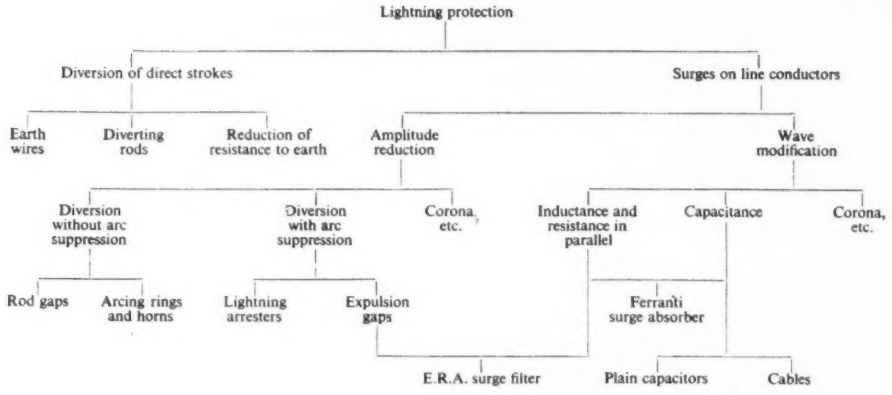
ELECTRIC COMPANY

SAINT LOUIS 20, MISSOURI AND TORONTO, ONTARIO, CANADA

Lightning Protection of Overhead Lines

Classification of various methods and devices for protecting overhead lines and substations against surges caused by lightning are given diagrammatically. Functions, requirements and limitations of the various devices are listed in the table. These protective measures are adapted from a paper "The Lightning Protection of High-Voltage Overhead Transmission and Distribution Systems" by H. M. Lacey; *Proceedings* Institution of Electrical Engineers (London), 1949, **96**, Part II, p. 287.

Methods For Protecting Against Lightning



Summary of Characteristics of Protective Devices

Device	Functions	Requirements for satisfactory operation	Limitations
Earth wire	Diversion of direct strokes from line conductors	Towers must be well earthed	May fail to protect at high towers
Arcing rings and horns	Protection of insulators	Setting must not be more than 80% of arcing length of insulator string	Does not prevent outage. May fail to protect insulator string against very steep wave
Rod gap	Limitation of voltage left on line	Must be adequately earthed	Considerable time-lag. Does not prevent outage. Causes steep-backed wave.
Expulsion gap	Limitation of voltage left on line, and interruption of follow current	Must be adequately earthed. Should be so mounted that external gap remains constant	Short-circuit characteristics of system must must be known. Appreciable time-lag.* Not permanent.
Lightning arrester	Limitation of voltage left on line, and interruption of follow current	Must be well earthed. Leads must be short. Advisable to connect earth lead to case of apparatus to be protected	Does not reduce steepness of wave front prior to breakdown. May not withstand a current of long duration
Cable	Flattening of steep waves	Good earthing of sheath at junction with overhead line. Good connection between sheath and case of protected apparatus	Does not reduce amplitude of a long wave. Satisfactory operation depends on surge impedance of overhead line
Ferranti surge absorber	Flattening of steep waves	Good connection between earth terminal and case of protected apparatus	Does not reduce amplitude of a long wave unless provided with protective gap on the line side
E.R.A. surge filter	Flattening of steep waves and limitation of voltage amplitudes	Good connection between earth terminal and case of protected apparatus	Dependent on characteristics of discharge path of device.

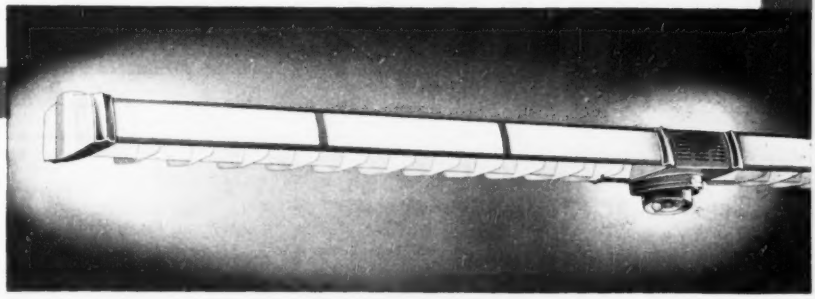
* Time-lag may be an advantage when an expulsion gap is used for suppressing follow-current after a back flashover, since flashover is not desired, provided that insulators withstand the conditions.

Note: E.R.A. = British Electrical and Allied Industries Research Association, London, England.

These are the Wakefield *Grenadier "Spots"*

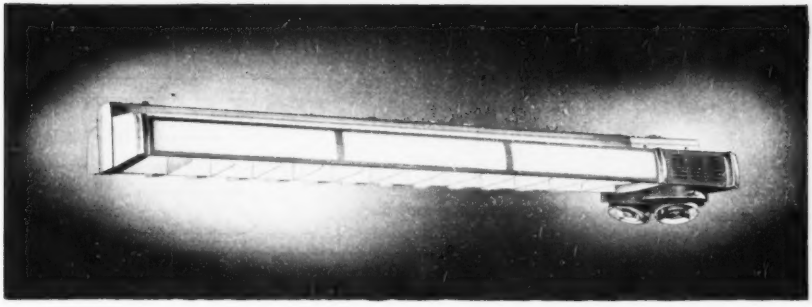
for double-duty store lighting...

In any installation where "spot" lighting and general lighting are desirable, you can recommend the Wakefield Grenadier "Spots" to do the double job with complete confidence. To all the proved advantages of the regular Grenadier has been added the plus advantage of an excellently designed spotlight assembly. Wakefield Grenadiers are finely engineered louvered units with translucent white plastic side panels. All metal parts are beautifully finished in soft metallic satin. For complete details on Grenadiers and the entire Wakefield line, you should have our fully illustrated, factually written, 36-page catalog. Write for your copy today.



THE GRENADIER II "SPOT"

Takes two 40W fluorescent lamps in each 4' section. Each 4' section has a single adjustable "spot" taking a 150W Sealed-Beam lamp.



THE GRENADIER IV "SPOT"

Takes four 40 W fluorescent lamps in each 5' section. Each 4' section has two adjustable "spots", each taking a 150 W Sealed-Beam lamp.

Wakefield Over-ALL Lighting

FOR OFFICE • DRAFTING ROOM • STORE AND SCHOOL

THE STAR THE GRENADIER II THE COMMODORE THE DIPLOMAT

Some Design Data for Trash Racks

H. W. HAMM, Design Engineer, S. Morgan Smith Co, York, Pa.

Accompanying table and formula provide data for spacing of bars when placed in a vertical position and for calculation of head loss with respect to shape of bars

Spacing of Vertical Bars

Type of Turbine and Location of Racks	Space between bars
Impulse Turbines	1/5 of Nozzle diameter
Racks in front of Long Pipe Lines	3/4 in.
Medium Size Francis and Kaplan Turbines	2 to 3 in.
Large Size Kaplan Turbines	3 to 6 in.

Note: For high head installations with pipe line, a mesh rack is recommended instead of bars.

References:

Prof. A. Ludin, Wasserkraftanlagen, Berlin, 1934.
Dr. F. Bundschu, Druckrohrleitungen, Berlin, 1926.
Prof. O. Kirschmer, Laboratoire Hydraulique Centrale, Paris.

Formula for Head Loss In Trash Rack

$$H_R = \beta \times \sin\alpha \times \frac{d}{a} \times \frac{1.33 \times v_u^2}{2g}$$

where

H_R = friction loss, in feet

β = flow coefficient (see table)

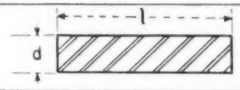
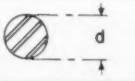
d = Maximum width of bar, in inches

a = Space between bars, in inches

v_u = water velocity upstream from rack, in feet per second

α = angle between rack and direction of flow, in degrees

g = 32.2, acceleration due to gravity, in feet per second^2

β	Bar Shapes (cross section)
2.42	
1.83	
1.67	
1.03	
0.92	
0.76	
1.79	

β, flow coefficient, for bar shapes (shown at right) with a ratio ▶ $l/d = 5$,
where, l = length (in direction of water flow) and d = width (horizontally across direction of flow)

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QUICK DELIVERY

The 25′ pole with 6′ bracket and base having 3″ x 5″ hand hole, as illustrated, is now carried in stock in our Chicago plant . . . Many other designs are available for various mounting heights, bracket lengths, and with provision for mounting transformer in base or with fittings for overhead wiring . . . The wall thickness of our poles at the base is over ¼″, giving that added assurance of strength and long life . . . Complete information on request.

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Complete Pole Line Equipment

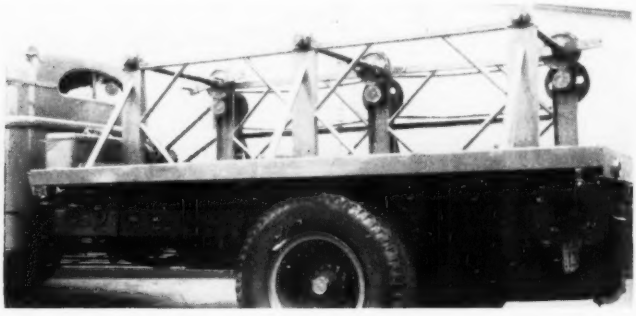
20 NORTH WACKER DRIVE, CHICAGO 6, ILL.

G. AND
PPLY CO.

Wire Stringing Rig Doubles Stringing Rate

R. M. MIDDLETON
Supt of Transportation
San Diego Gas and Electric Co

OVERHEAD CONDUCTOR STRINGING RIG has saved 50% of time required for replacing distribution conductors. It mounts four half reels as shown or three standard reels in tandem, pulls out old conductor at 25-150 ft per min



ADJUSTABLE DOG, conical adapter with set screw fits any stanuard reel. Shafts are driven from power take off sprocket on winch through steel-cut gears, total reduction 6 to 1

CLOSE BRAKING CONTROL at the feed-in end is provided by mechanical automobile brakes on the three shafts. Brake rods are connected by turnbuckles to a common shaft to coordinate braking on all three reels as conductors are paid out

SAN Diego Gas and Electric has built a truck-mounted overhead conductor pulling rig which cuts stringing time by 50%. It was built originally for replacing conductors on distribution circuits, using the old conductor to pull in the new. It is also used to pull in new conductor up to 1 0 on either 3 or 4-w circuits.

The rig is completely self-contained except for power supply, and can be moved from truck to truck. Standard cable reels, either wood or steel, are mounted on three shafts in tandem on a self-supporting frame. Adjustable dogs and a conical adapter with a set-screw on the shaft fit all standard reels. Pulling power is supplied from a power take off through a chain drive to all three reels. Sprocket reduction is 2 to 1 from the take off, and gear reduction 3 to 1 to the reel shaft, giving total reduction of 6 to 1. Pulling speed is adjustable by engine speed, and may vary from 25 to 150 ft per min. To pull in four conductors, two half reels with extended rims are mounted on the front and rear shafts. Each reel will handle 1,200 ft of rope.

To provide satisfactory feed and control of the new conductor, a special trailer-mounted feed rig is used. It is built up of three shafts for mounting reels in tandem, similar to the pulling unit. Instead of being power driven the shafts are braked by individual mechanical automobile brake assemblies. Operating rods of the three brakes are connected through turnbuckles to a single common braking handle. Proper adjustment of the turnbuckles provides coordinated braking on all three reels as the conductor is paid out. This gives close control over sag during pull-in, giving more dependable clearance over adjacent hot circuits. Frames of both truck and trailer are grounded with a ground chain during such operation.

Operation of this equipment over the past two years has doubled production without any increase in manpower for the crew.

Wagner Distribution Transformers

are *Standardized*

to meet your requirements

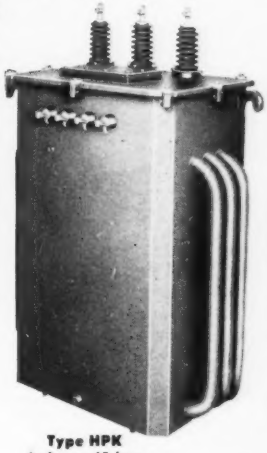
Type HEK
Single-phase
3 kva.

Wagner's complete line of distribution transformers includes every rating and design listed in the E. E. I.–NEMA Fourth Report! This means that you get the benefit of the improved design, quality construction and high efficiency of Wagner Transformers with *standardized* mechanical features in ratings of 500 kva and below—15,000 volts and below.

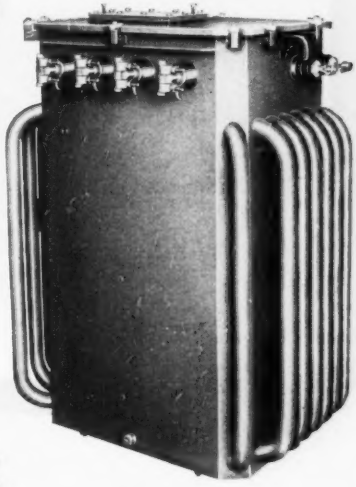
You save time, money and worry when you make your selection from Wagner's widely diversified line of distribution transformers — no matter what your particular requirements may be . . . there's one to fit your needs.

Type HEX
Single-phase
25 kva.

Type HEB
Single-phase
75 kva.



Type HPK
3 phase—45 kva.



Type HPB
3 phase—112½ kva.

Wagner has a nationwide organization to provide fast, convenient service, with 29 branches located in principal cities ready to help you with your transformer problems. Bulletins TU-180 and TU-181 give complete information on Wagner Transformers.

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Consult Wagner Engineers on All Transformer Problems

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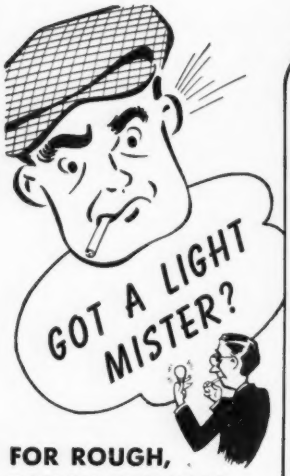

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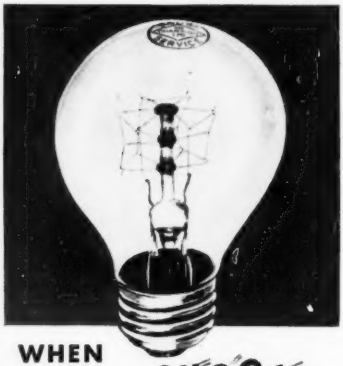
ASK YOUR INDUSTRIAL OR ELECTRICAL SUPPLY HOUSE for these CHAMPION Special Service Lamps, or ask us to put you in touch with the supplier nearest you.

CHAMPION LAMP WORKS
Lynn, Massachusetts

A DIVISION OF CONSOLIDATED ELECTRIC LAMP CO.

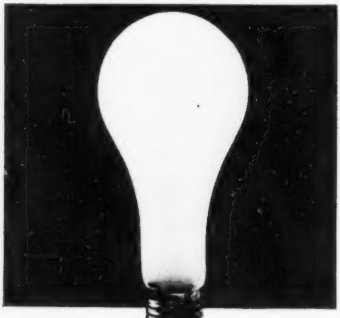
WHEN THERE'S VIBRATION

CHAMPION *Vibration Service* Lamps are specially engineered and constructed with filament mounting and super flexible filament entirely different from that of ordinary lamps. They stand up under severe and sustained vibration.



WHEN THERE'S SHOCK

CHAMPION *Rough Service* Lamps are just what the doctor ordered for locations subject to sudden shocks or bumps, as when used with extension cords. As many as sixteen scientifically designed supports cushion the filament.



WHEN THERE'S SPLASH

CHAMPION *Hard Glass* Lamps are specially designed for locations exposed to weather, moisture or splashing.

Electronic Power Supply For Precise Measurements

ELECTRIC POWER fed through new wide-range power supply equipment is kept from varying more than 0.005%. The instrument will be used by the Bureau of Standards in making electrical measurements requiring a virtually unwavering power supply.

The new equipment has a continuously variable voltage output from 500 to 50,000 v with a maximum current output of one milliampere. The high voltage is attained through the use of a radio-frequency oscillator, power amplifier, r-f transformer, and a ladder-type voltage tripler circuit. Use of the r-f source, about 40 kc, makes possible reduction of the output ripple to a low value by simple filtering means. This minimizes the equipment's weight (350 lb) and size (84 x 23 x 20 in.).

Exceptional Stability

Developed by the G-E General Engineering and Consulting Laboratory, the wide-range power supply has been designed with exceptional stability as to output voltage, ripple, and load regulation. Output power, supplied through a 15-ft x-ray cable, is not affected by variations in line voltage or frequency. Full compensation is made for ambient temperature changes, and precision regulation is attained through the use of two regulating loops in cascade.

Power to be monitored is fed into connections at the base of the apparatus, run through the 32-tube electronic controlling circuit, and brought out through cables at the unit's top.

Primary Cutout Also Has Switching Ability

C. E. SCHULTHEISS
Development Engineer
S & C Electric Co
Chicago, Ill.

AN ENCLOSED bayonet-type cutout has been designed to serve also as a switching device. Known as the new Positect this primary distribution cutout is a development of S & C Electric Co. (formerly Schweitzer and Conrad Inc) Chicago, Ill. It has current ratings of 50 and 100 amp

SAFEST DEADEND for urban distribution circuits

● With a 10,000-pound mechanical ultimate and a 60-kv dry flashover, this O-B distribution deadend assembly puts both high electrical and mechanical safety factors where they count! In view of the rapid trend toward higher voltages, today, six-inch suspension units for urban distribution application are becoming standard on primary deadends. Even on systems not yet stepped up, they provide valuable protection and eliminate troublesome deadend revisions when the system is later cut over.

Delivery of the O-B six-inch unit, No. 32433, and the O-B Universal Strain Clamp, No. 81500, will be made promptly to any location specified, and at no additional expense to you, by your local Graybar representative. You not only save time but also store room expense and often a considerable freight charge by availing yourself of Graybar's stocking and delivery service.

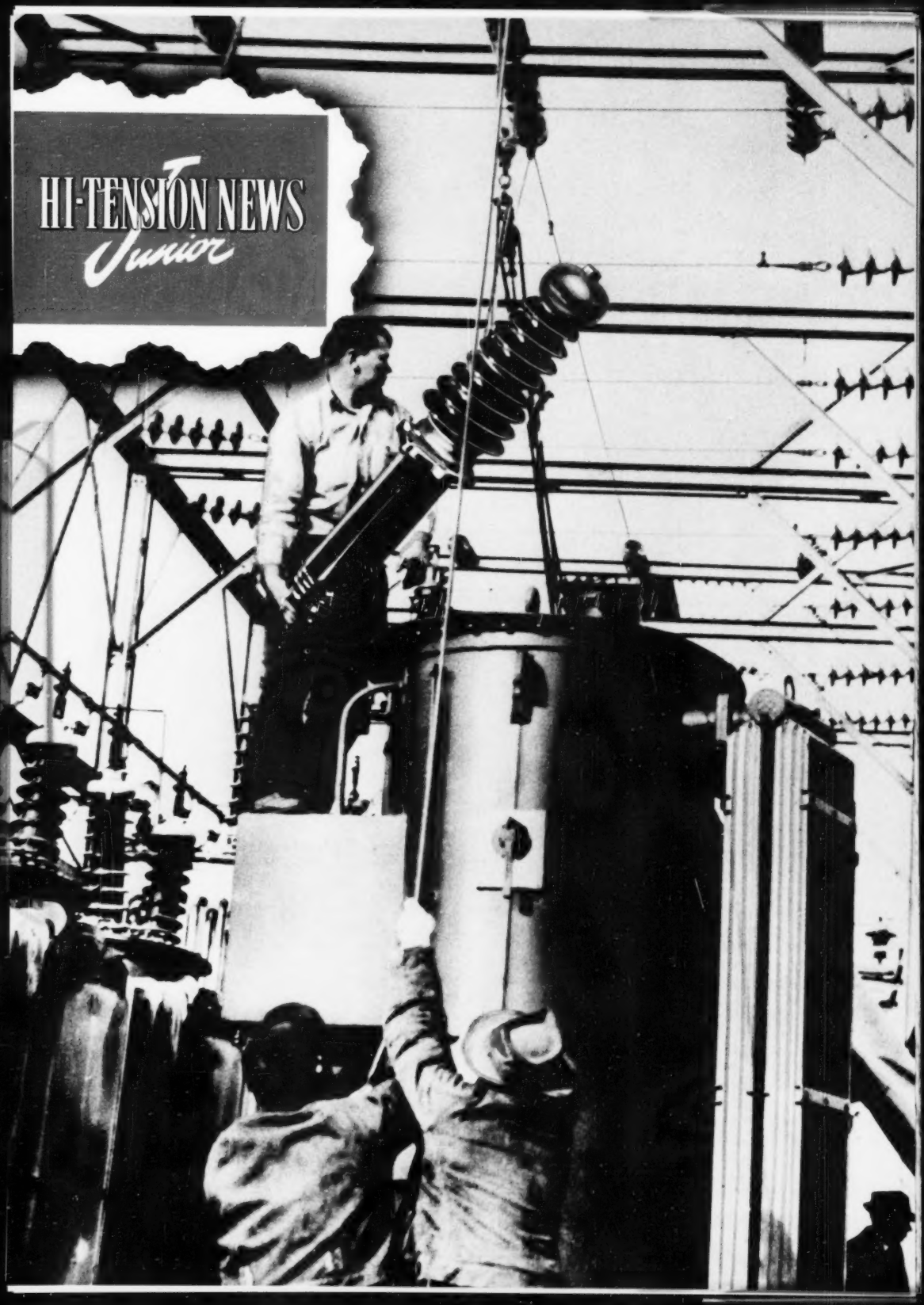
Build your deadends the modern way with these O-B materials—buy them the modern way through Graybar.

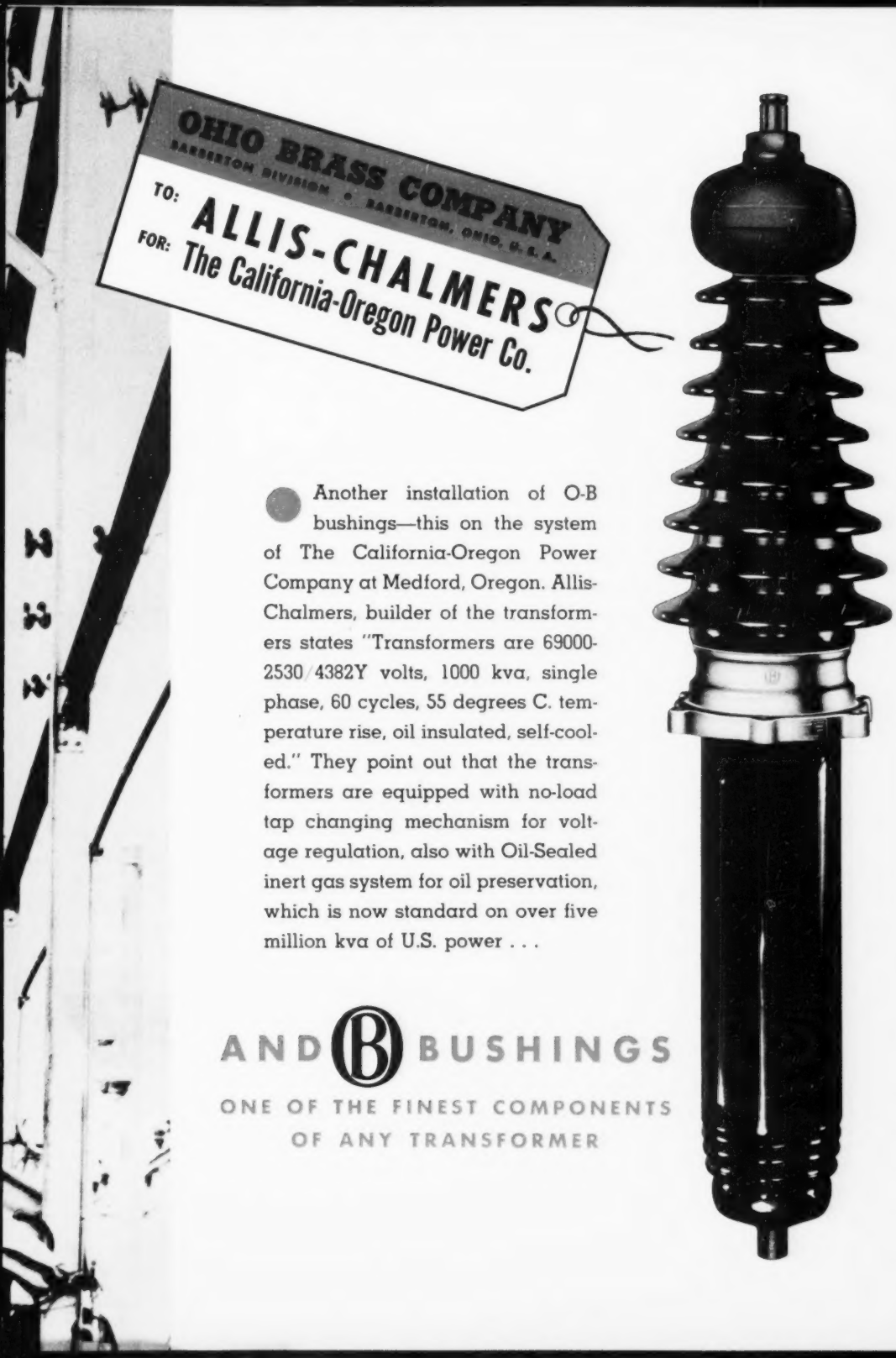
Ohio Brass

MANSFIELD, OHIO, U. S. A.

Distributed by GraybaR ELECTRIC COMPANY

HI-TENSION NEWS *Junior*





Another installation of O-B bushings—this on the system of The California-Oregon Power Company at Medford, Oregon. Allis-Chalmers, builder of the transformers states "Transformers are 69000-2530/4382Y volts, 1000 kva, single phase, 60 cycles, 55 degrees C. temperature rise, oil insulated, self-cooled." They point out that the transformers are equipped with no-load tap changing mechanism for voltage regulation, also with Oil-Sealed inert gas system for oil preservation, which is now standard on over five million kva of U.S. power . . .

AND (B) BUSHINGS

ONE OF THE FINEST COMPONENTS OF ANY TRANSFORMER

1 HOLDS TIGHTER THAN A TIE WIRE

2 NONE OF THE DANGER OF A HOT TIE

3 LOWEST RADIO INTERFERENCE

4 QUICK AND EASY TO INSTALL

HI-TENSION NEWS Junior

O-B CLAMPTOPS BRING YOU ALL FOUR!

Eliminate the tie wire and you get rid of a lot of trouble as well as a lot of expense. The solid clamp connection on the O-B Clamptop develops at least 2,000 pounds lateral strength. Because this is done by tightening only two hex nuts, you get this strength at every insulator whether installed cold or hot . . . and it stays tight! Installation or removal can be done safely. There is no danger of the loose end of a hot tie contacting the lineman or another part of the structure—*there is no tie!*

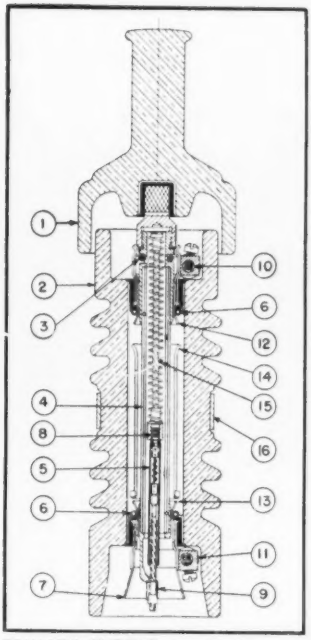
Permanently tight connection with the conductor, plus the improved electrostatic field resulting from a properly shaped clamp, results in the lowest radio interference level of any pintype insulator.

Two nuts can be spun down and tightened in a fraction of the time required to attach a conventional tie wire. In hot line work, this is particularly important. Added to this saving in time is the economy of eliminating the length of wire required for the tie.

O-B Clamptops bring you all these very worthwhile advantages, plus the fundamental soundness found in all other O-B pintype insulators. Put Clamptops on your next line and discover for yourself how they simplify the job.

Ohio Brass

MANSFIELD, OHIO, U.S.A.



PRIMARY CUTOUT can function as a switch. Components are: 1–Porcelain handle, 2–porcelain housing, 3–gas operated lock, 4–fiber lined bakelite fuse tube, 5–fuse link, 6–backup spring for contacts, 7–arc chute, 8 and 9–upper and lower terminals of fuse link, 10 and 11–upper and lower line terminals, 12 and 13–upper and lower silver-plated contacts, 14–auxiliary fiber liner, 15–spring and cable assembly, 16–clamp strap for mounting bracket

and is applicable on 2,400-v through 7,200/12,470-v grounded wye systems. Major components are a fiber-lined bakelite fuse tube containing the fuse link which is held under tension by a spring-and-cable assembly; a gas-operated locking mechanism; and a fiber-lined porcelain housing.

Cutout Operation

As a cutout, the short-circuit interrupting range extends up to 16,000 rms amp. When the fusible element is melted, the spring collapses, carrying with it the upper fuse link terminal and providing a positive terminal separation. As the arc is lengthened within the fiber-lined fuse tube, deionization occurs and the current is interrupted. This method of drawing the arc allows free venting, avoiding high pressure buildup and peaked arc voltages during interruption.

In the case of heavy fault currents, the gas-operated locking mechanism holds the handle-and-fuse-tube assem-

Manhole moisture can no longer injure lead-sheathed cable

Positive waterproofing and corrosion resistance
•
No elaborate cable cleaning necessary
•
Easy and clean to handle
•
Easily applied in narrow clearances
•
Uniform thickness insures smooth coverage
•
Easily stocked

● Now NO-OX-ID Wrap, created for electric utilities, and approved by competent electrical engineers, provides new corrosion resistance for cables in damp and sometimes water-filled manholes.

The new NO-OX-ID Wrap combines two steps in cable protection . . . a rust-preventive coating and a water-repellent wrapper in a convenient roll. It seals the cable against moisture and vapor, chemically prevents corrosion on surfaces which are already pitted.

NO-OX-ID Wrap is a timesaver . . . eliminating the usual separate coating and wrapper applications before fireproofing. In manholes where duct entrances are crowded, it insures better control of coating operations, smoother coverage, guards against voids. Engineers enthusiastically report its use as most satisfactory.

Send for this Sample

Dearborn
Reg. U.S. Pat. Off.
CHEMICAL COMPANY
Dept. EW4, 310 S. Michigan Ave., Chicago 4, Ill.
New York • Los Angeles • Toronto

Dearborn Chemical Company, Dept. EW4
310 S. Michigan Ave., Chicago 4, Illinois

Please send sample roll of NO-OX-ID Wrap.

Name_____ Company_____
Please Print

Address_____

City_____ Zone____ State_____

YOU CAN BE **SURE**.. IF IT'S

Westinghouse

PROOF

FROM

MINNESOTA

"We saved 750 service calls with 'CSP'"

Nowhere does the built-in thermal protection of the "CSP"* Completely Self-Protecting transformer offer more conclusive evidence than this statement of a midwestern operator:

A total of 2,641 distribution transformers are in service; 1,967 are Westinghouse "CSP" units, 674 are conventional types.

From July 31, 1941, through December 31, 1947, the utility made 303 service trips for transformer outages caused by thermal conditions:

271 were made to conventional transformers; 32 were made to "CSP" units.

The record becomes more striking when the figures are reduced to a unit basis. Conventional transformers required one service call for approximately every two units. "CSP" transformers required one service call for every 60 units! If the "CSP" transformers had shown the same rate of outages, there would have been 750 more calls over the six-year period.

One sure fact stands out: the built-in thermal protection of "CSP" transformers cuts service costs. Westinghouse Electric Corporation, P. O. Box 868, Pittsburgh 30, Pa.

J-70524

*Trademark—Reg. U. S. Pat. Off.

PROVE IT YOURSELF with this new book that lets you compare Completely Self-Protecting transformers with conventional types—using your own figures for original investment, installation maintenance, depreciation and interest. Ask for B-4247, "Transformer Costs and Their Relation to Profits".

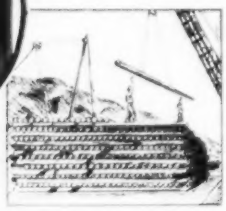
Call the Westinghouse Salesman

Westinghouse "CSP" TRANSFORMERS

SINGLE PHASE THREE PHASE BANKED SECONDARY

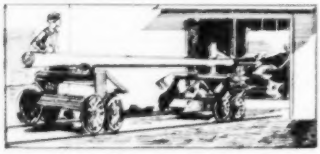
LONG-LIFE DOUGLAS FIR PRESSURE TREATED LONG POLES

For over 50 years J. H. Baxter & Co. with its Associated Pacific Coast Companies has specialized in the production and sale of exceptionally long (up to 125 feet) Wood Poles for the electric power, lighting and telephone utilities . . . Stocks in all lengths are complete . . . shipments prompt!



PROPER SEASONING

BAXCO poles are carefully seasoned in dry, clean yards. Proper pre-conditioning before Pressure Treatment adds years of longer life.

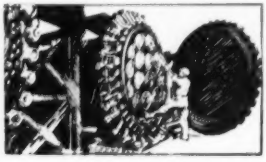


MACHINE SHAVING

To produce smoother and more uniform poles, the BAXCO process includes machine shaving. This removes small swells and results in a more round, evenly tapered product.

PRESSURE TREATMENT

Deep penetration and high retention of the preservative is a hallmark of the BAXCO Pressure Treatment Method.



Get the Full Story! Write today for this BAXCO BOOKLET

J. H. Baxter & Co.

333 MONTGOMERY STREET · SAN FRANCISCO 4, CALIFORNIA

ASSOCIATED COMPANY: J. H. BAXTER & CO. OF OREGON

lily in place. This mechanism, shown near the top of the illustration, consists of a stainless steel coil spring over a leaf spring collar which encircles a perforated section of the upper ferrule of the fuse tube. This spring expands under gas pressure developed within the fuse tube during fault current interruption. Thus expanded, the spring engages a slot located appositely in the upper contact assembly and in this position prevents any movement of the handle-and-fuse-tube assembly during even a severe operation. Following that operation the lock releases, permitting handle and fuse tube to be withdrawn.

Operation as a Switch

As a switching device, the insertion or withdrawal of the handle-and-tube assembly is all that is necessary for switching distribution transformer load or magnetizing currents, or small capacitor bank charging current. Between the upper and lower silver-plated copper alloy contacts the porcelain housing is partially lined with a vulcanized fiber tube. The arrangement confines and extinguishes the arc when the tube is withdrawn under load. A solid copper tube replaces the fuse tube when the Positect is to be used for switching purposes only.

As to safety features, because of its switching ability the Positect can be opened safely under load, either intentionally or inadvertently. If unknowingly closed-in on a short circuit, the handle-and-fuse assembly does not recoil, and all the discharge is from the arc chute at the bottom of the housing and in a direction away from the lineman.

Farm Service Must Be Good

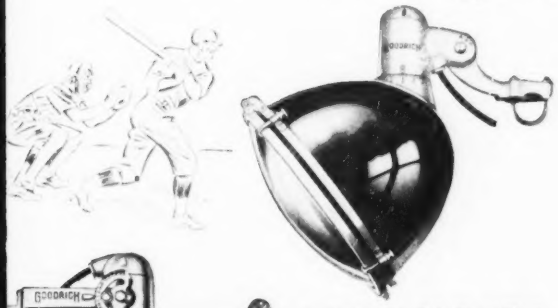
An Editorial in ELECTRICAL WORLD
August 3, 1935

"Rural Service must be good service and good service is not synonymous with cheap construction and equipment. A rural line is exposed and is relatively inaccessible to operating and maintenance crews . . . All these things make it economical and necessary to look upon rural electric service as a more severe specification than overhead service in a city."

DAY-MAKING MAGIC AT NIGHT!

APPLETON
"GOODRICH" FLOODLIGHTS

DIFFUSO—For even illumination of service stations, athletic fields, tennis courts, parking spaces, etc. Available for pole, bracket or crossarm mounting.



SPORTO—Supplied with or without glass cover. Weather-proof hood permits complete vertical and lateral positioning. Pole, bracket or crossarm mounting.

LUMO—Made from aluminum, Alzac Electro-chemically processed. With or without heat-resisting glass lens; narrow or medium beam spread. Pole, bracket or crossarm mounting.

Nighttime events are bathed in noontime brilliance under Appleton "Goodrich" Floodlights. Available in a wide variety of types and styles, these expertly engineered floodlights are designed to provide the utmost in after-dark vision.

The permanent porcelain enamel finish on Appleton Floodlights makes them ruggedly resistant to the most severe atmospheric conditions. They are furnished with hoods for bracket, pole or crossarm mounting. When specified, most models may be equipped with a water and dust-tight glass lens. All types may be cleaned quickly, easily—without removing wiring.

The Appleton Line of Lighting Equipment includes a type and size light to cover virtually every requirement, whether indoors or out. Each light is a model of mechanical simplicity—easily installed, easily wired, easily serviced. For the lighting equipment you need, specify Appleton.

Write for catalogue information.

Sold Through Electrical Wholesalers

APPLETON ELECTRIC COMPANY

1701 WELLINGTON AVENUE • CHICAGO 13, ILLINOIS

Branch Offices: NEW YORK, 50 Church St. • DETROIT, 3049 E. Grand Blvd. • CLEVELAND, 1836 Euclid Avenue • SAN FRANCISCO, 655 Minna St. • ST. LOUIS, 420 Frisco Bldg. • LOS ANGELES, 100 N. Santa Fe Avenue • ATLANTA, 724 Boulevard, N.E. • BIRMINGHAM, 429 Brown-Marx Bldg. • MINNEAPOLIS, 305 Fifth St., S. • PITTSBURGH, 414 Bessemer Bldg. • BALTIMORE, 100 East Pleasant St. • BOSTON, 10 High Street • DENVER, 1921 Blake Street • PHILADELPHIA, 1017 Cherry Street.

Resident Representatives:

Cincinnati, Dallas, Houston, Indianapolis, Kansas City, Milwaukee, Seattle.

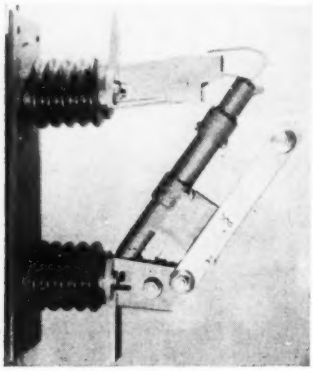
Export Representatives:

International Standard Electric Corp., 67 Broad St., New York 4, N. Y.

APPLETON

CONDUIT FITTINGS • LIGHTING EQUIPMENT • OUTLET AND SWITCH BOXES • EXPLOSION-PROOF FITTINGS • REELITES

NEW EQUIPMENT



Air Interrupter Switch

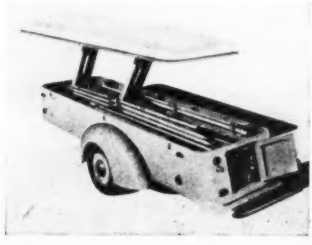
LOAD CURRENTS of 600 amp at voltages up to and including 15 kv may be switched with this indoor type air interrupter switch manufactured by Electrical Engineers Equipment Co, Melrose Park, Ill. To this switch, an indoor disconnecting type with modified clip construction, has been added an interrupter tube containing an arcing chamber, which operates on the deionizing principle, and a spring-operated arcing rod.

The company reports that interruption is accomplished within one cycle without arcing or burning of contacts. Any generated gases are expelled through vents in the upper end of the tube. Switches are listed for hoop stick or group operation in metal and enclosed models. Additional information is contained in Bulletin 141.

•

Hot Line Tool Trailer

TO HANDLE maintenance jobs faster and safer, a hot line tool trailer is manufactured by A. B. Chance Co, Centralia, Mo. Four racks of padded, adjustable hooks hold tools for maintenance of all types. Built-in troughs and bins will accommodate tool accessories, tap clamps, grounding equipment, etc. An electric heater, operating while the trailer is not in use, keeps the tools dry.

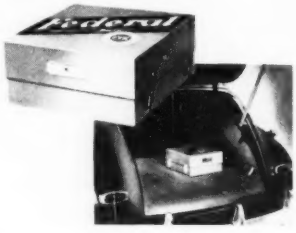


The waterproof, counter-balanced top has a brace to prevent accidental closing and can be locked in a closed position. Rear door allows access to rear storage space. The trailer can be supplied with a complete set of Chance hot line tools for all maintenance jobs.

•

Mobile Radiotelephone

FEATURING modulation limiting, a mobile radiotelephone unit having an output of 10 w in the 152-162 Mc band has been developed by Federal Radio and Telephone Corp, 100 Kingsland Rd, Clifton, N. J. According to the company, the FT-145-10 complys with new FCC rules and regulations whose effective dates are July 1, 1949 and July 1, 1950. Modulation limiting, one of the



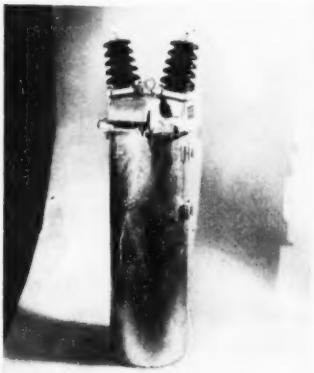
items contained in the regulations, is said to eliminate interference due to over-deviation which causes "spill-over" from the operating channel into adjacent channels.

The unit utilizes a minimum number of tubes, all miniature, and all top tuning, permitting adjustment of the set without disengaging unit. Receiver squelch can be controlled remotely and an automatic resetting circuit breaker is provided. The unit measures 5 5/16 x 12 3/16 x 14⅛ in. and weighs 27.5 lb without cables and control housing.

•

Rural Line Recloser

FOR RURAL service at 2.3 to 15 kv, a 100-amp. type GR line recloser with interrupting capacity of 1,000 to 4,000



amp is announced by Westinghouse Electric Corp, Box 868, Pittsburgh 30, Pa. The unit operates with three time-delay openings and closings followed by a fourth time-delay opening and lockout. Initial open-close operation can be made in 12 cycles or less by changing pipe plug.

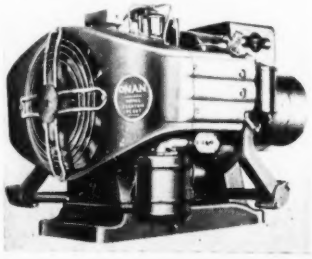
Breaker is self-protected against burnouts and damage by lightning. Trip coil will carry minimum trip current continuously and is protected against lighting surges. Oil and contact burning is minimized by De-Ion grid interrupters. GR reclosers are available for crossarm, direct pole or extended pole bracket mounting.

•

Diesel-Electric Plant

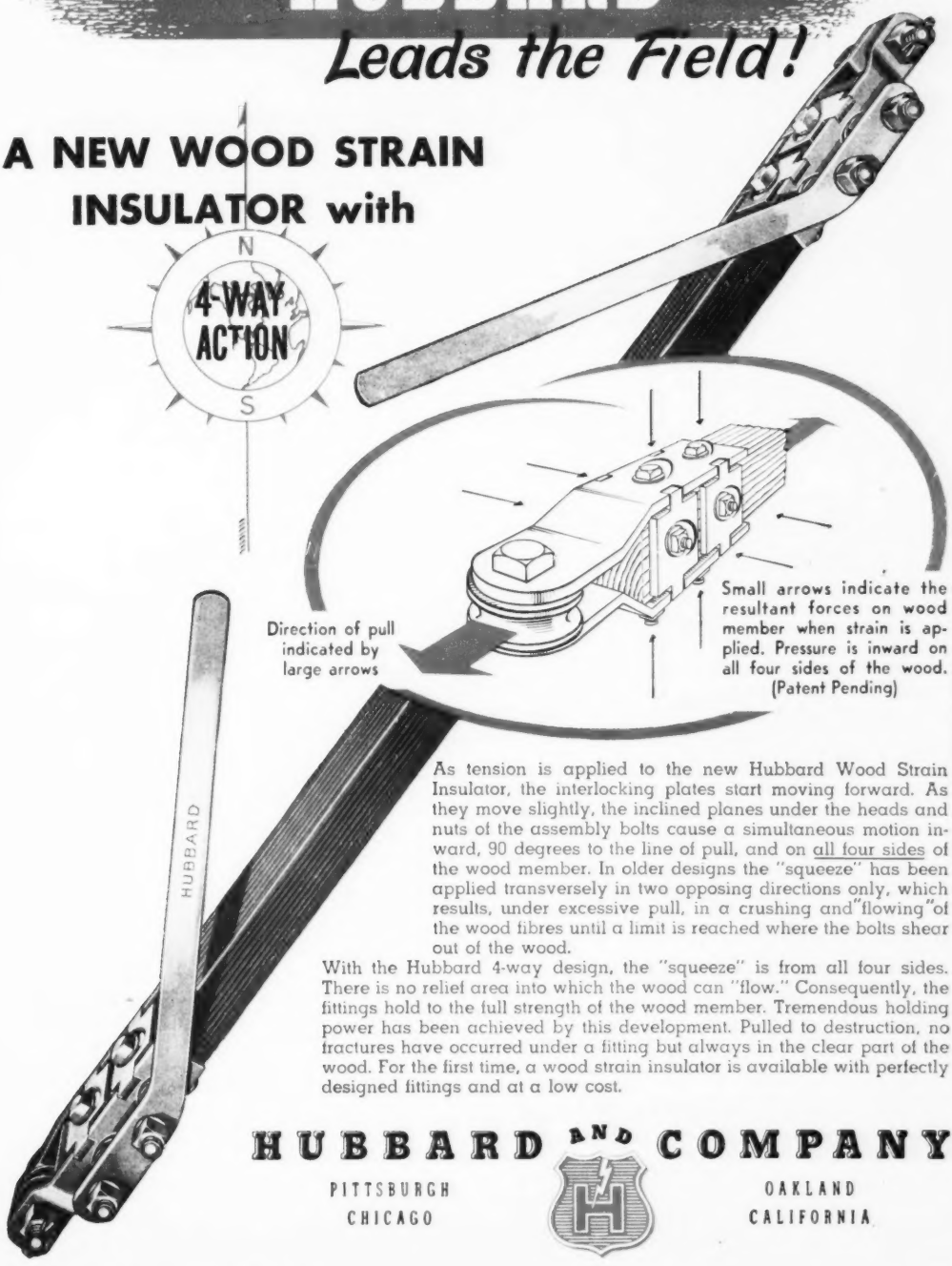
ELECTRIC power for remote and emergency service is provided by this 5-kw, a-c diesel-electric plant manufactured by D. W. Onan & Sons, Inc. Minneapolis 5, Minn. Model 5DRP is available in all standard voltages at 50 or 60 c.

Prime mover is an Onan-designed,



Once Again
HUBBARD
Leads the Field!

A NEW WOOD STRAIN INSULATOR with



Direction of pull indicated by large arrows

Small arrows indicate the resultant forces on wood member when strain is applied. Pressure is inward on all four sides of the wood. (Patent Pending)

As tension is applied to the new Hubbard Wood Strain Insulator, the interlocking plates start moving forward. As they move slightly, the inclined planes under the heads and nuts of the assembly bolts cause a simultaneous motion inward, 90 degrees to the line of pull, and on all four sides of the wood member. In older designs the "squeeze" has been applied transversely in two opposing directions only, which results, under excessive pull, in a crushing and "flowing" of the wood fibres until a limit is reached where the bolts shear out of the wood.

With the Hubbard 4-way design, the "squeeze" is from all four sides. There is no relief area into which the wood can "flow." Consequently, the fittings hold to the full strength of the wood member. Tremendous holding power has been achieved by this development. Pulled to destruction, no fractures have occurred under a fitting but always in the clear part of the wood. For the first time, a wood strain insulator is available with perfectly designed fittings and at a low cost.

HUBBARD AND COMPANY

PITTSBURGH
CHICAGO

OAKLAND
CALIFORNIA

ON and ON and UP and UP!

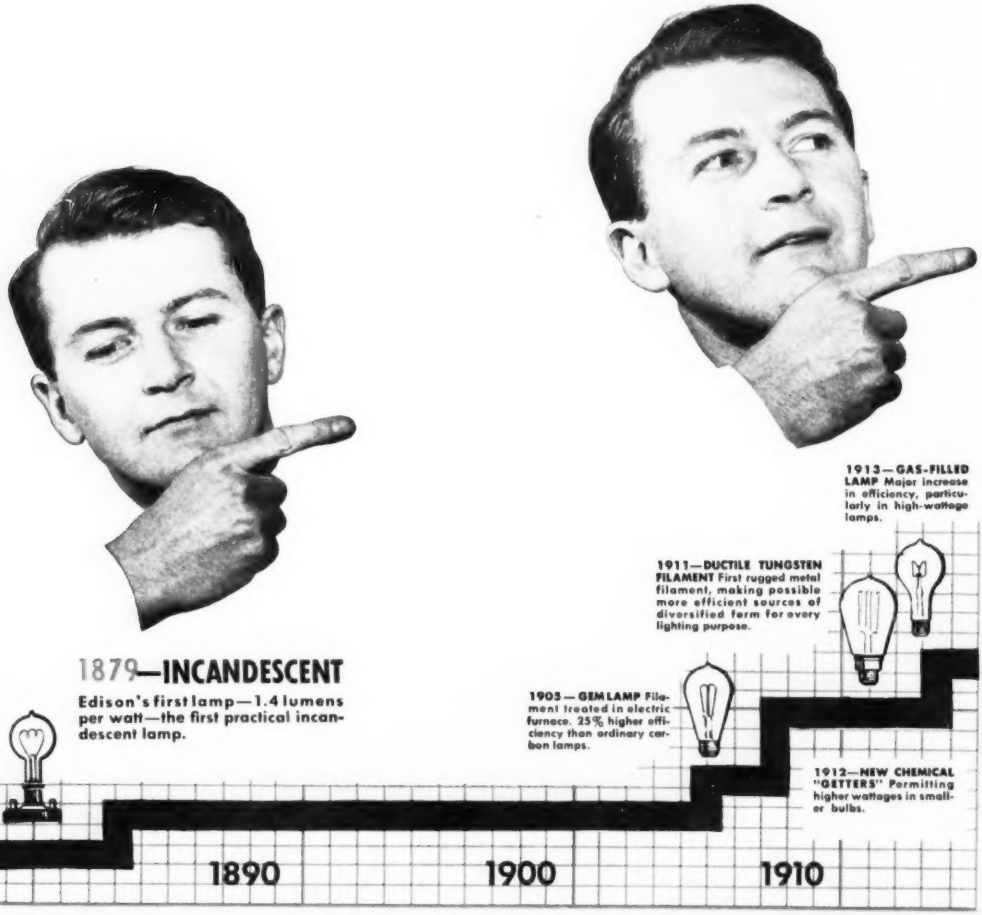
EVER since the development of Thomas Edison's first practical incandescent lamp 70 years ago, General Electric Lamp research has been constantly at work to make lamp bulbs better.

This graph tells the story.

As General Electric Lamp research has continued steadily onward, the efficiency of G-E lamps has gone steadily upward, until today slimline fluorescent gives 50 times as much the light per watt as Edison's lamp of 1879.

Through giving customers greater and greater lighting value, General Electric has helped increase the use of better lighting everywhere. And an important assurance of ever-growing lighting business for utilities is the General Electric Lamp research which is always at work to make G-E lamps *STAY BRIGHTER LONGER!*

GENERAL ELECTRIC


1879—INCANDESCENT
Edison's first lamp—1.4 lumens per watt—the first practical incandescent lamp.
1903—GEM LAMP Filament treated in electric furnace. 25% higher efficiency than ordinary carbon lamps.
1911—DUCTILE TUNGSTEN FILAMENT First rugged metal filament, making possible more efficient sources of diversified form for every lighting purpose.
1912—NEW CHEMICAL "GETTERS" Permitting higher wattages in smaller bulbs.
1913—GAS-FILLED LAMP Major increase in efficiency, particularly in high-wattage lamps.
1890
1900
1910

Lighting's share of total electrical energy used

1945 —**SLIMLINE**
A new type of fluorescent. Instant start; long, slender lines of light.

1938—**FLUORESCENT**
A revolutionary lamp development. Radically higher efficiency with much less radiant heat.

LUMENS PER WATT

1919—**TIPLESS LAMP** Eliminated tip breakage and improved lamp appearance.

1925—**INSIDE-FROSTED LAMP** A smooth bulb, diffusing light with negligible loss in output.

1937—**COILED-COIL FILAMENT** Produced still more light per watt.

1949—**DELUXE-WHITE LAMP** First bulb to give complete diffusion without appreciable loss of light.

1915—**NONSAG WIRE** Kept close-pitch filament coils from stretching or shorting. Better maintenance of efficiency.

GE LAMPS

1920 1930 1940 1949

increased from 24% to 30% between 1936 and 1946

opposed-two-cylinder engine. Air cooling keeps the total plant weight down to about 725 lb, less batteries. Two intake manifolds have built-in heaters connected to the starting batteries. Saturated field generator is self-regulating without the use of additional electrical controls. Model 5DRP is said to run so smoothly that it requires no bolting down or special base.

•

Brush and Weed Killer

REPORTED to be sudden death to brush and weeds, Weedone Brush-Killer 32 has been brought out by American Chemical Paint Co, Ambler, Pa. Over 85 different varieties of woody plants, including sumac, poison ivy, Osage orange, certain oaks and bramble brushes, are eradicated by this preparation, according to the company.

This product contains 2,4,5-T and 2,4-D and mixes with water or oil.

•

Hazardous Location Timer

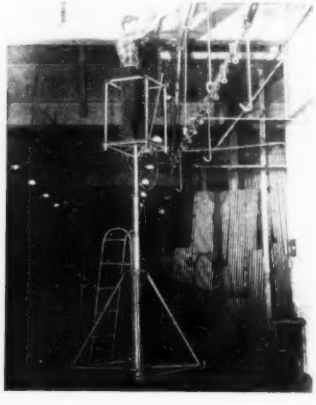
TIMERS for controlling electrically operated valves and motors in explosive atmospheres of gasoline, lacquer solvent or natural gas are available from Eagle Signal Corp, Moline, Ill. Microflex timers are enclosed in cast iron housings with machined metal-to-metal seals, suitable for use in Class I, Group D and Class II, Group G locations.

Micrometer dial is mounted on cover of case for adjustability and visibility. Standard dials are 120 sec, 20 and 120 min, and 20 and 60 hr.

•

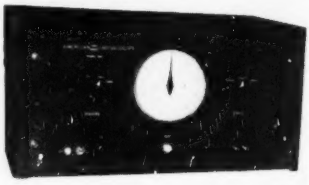
Maintenance Tower

TO SPEED overhead factory and building maintenance, a hydraulically raised, manually operated, all-steel rolling tower has been introduced by Safway Steel Products, Inc, Milwaukee 13, Wis. Work may be performed at platform levels from 7 to 17 ft above floor. Integral tubular steel ladder provides access to platform in its retracted position.



Platform is raised on telescoping ram by manual reciprocation of lever on platform. Turning a convenient toggle lowers platform. Guard rail, 33 in. high, encloses platform and may be lowered to reduce minimum height to less than 7 ft. Two opposite side members of base telescope to length of 30 in. permitting passage through narrow doors. Safety brake on each caster locks wheel and swivel.

•



Electronic Stopwatch

MEASUREMENT of short time intervals over the range from 10 μsec to 1 sec is possible with Model 100 high speed chronoscope developed by American Chronoscope Corp, 150 S. Middle Neck Rd, Great Neck, N. Y. This instrument automatically determines time intervals by means of a stable capacitor discharging through a stable resistor for the period of time to be measured.

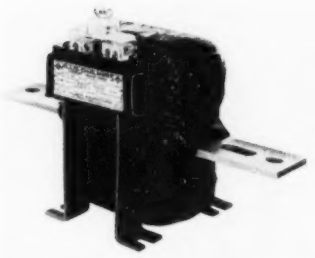
Time interval is presented by a voltage pulse from 6 to 120 v, a short circuit or an open circuit. Resultant reading is then observed on clock face. Controls consist of four switches—off-on, input, range and reset. Unit is rated at 117 v, 50/60 c, 120 w.

•

Current Transformer

FOR indoor service, a 600-v current transformer, Type KLW, has been announced by Allis-Chalmers Mfg Co, 932 S. 70th St, Milwaukee, Wis. It is made with single primary and single secondary with accuracy suitable for one or two watthour meters.

One high voltage terminal pad has provision for potential connection to meters. Clamp type connectors for outgoing leads facilitate meter connections. Transparent cover permits observation



of shorting device and is sealable in either direction.

Transformers are available in 200, 400 and 600-amp ratings. The 400-amp rating is designed to operate continuously at 150% rated current and the 200 and 600-amp ratings for continuous service at 200% rated capacity. Type KLW can be used with or exchanged with similar transformers of different manufacture.

•

A-C Arc Welders

FOR GENERAL welding and maintenance in industrial plants, garages and farms, Model 170 portable a-c arc welder, made by Birdsell Mfg Co, Inc, Box 733, Los Altos, Calif., has a range of 15 to 170 amp for electrode diameters from $\frac{1}{16}$ to 5/32 in.

This unit features an unload voltage

of 53 v, stepless amperage control using a single control bar, and a quick-starting arc. It is available for 110/220 v and 220/440 v (special). Accessories as shown are extra. Additional specifications plus general welding instructions are available upon request.

•

Oil Conditioner

TO CONDITION turbine oils or other low viscosity, high demulsibility oils which contain rust or oxidation inhibitors, an oil conditioner is being produced by Bowser, Inc, Fort Wayne,

Compact-Easy to Handle...

...and Sturdy, Too!

This FARGO "One-Piece"...Vise-Type Connector*

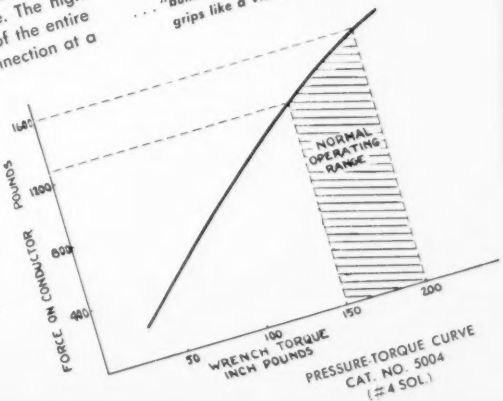
Weighs Only 3 Ozs.—but It's Jaws Exert a Pressure on the Wires Equal to ¾ of a Ton!

Fargo Connectors are built on the long established principle of the ordinary bench vise, and have the same high mechanical efficiency for converting a tortional force to a compressive one. The high compression ratio shown for #4 wire size is typical of the entire family of sizes. It means a sturdy, low resistance connection at a cost no more than other types.

At normal tightening torques, the wedging action of the sliding members makes a joint permanently free from loosening troubles.

Fargo Connectors are easy to use, because with their "one-piece" design, there are no threads to start—no loose parts to lose.

*Approved by National Board of Fire Underwriters.



FARGO

Manufactured by
FARGO MFG. COMPANY, INC.
Poughkeepsie, N. Y.
Distributed by
LINE MATERIAL COMPANY
Milwaukee, Wisconsin

LM

CREWS WORK FASTER, *Safer* with COFFING SAFETY-PULL HOISTS

Stretch guys or cables, lay conduits, do all pulling and lifting — quickly, easily, *safely*. Coffing Safety-pulls are light and compact for easy handling—chain is "free wheeling" when not under load. Coffing design speeds work, yet gives extra protection to equipment and crews:

1. Factory tested at 100% over rated capacity. "Safety valve" handle avoids dangerous overloading.
2. Dual ratchet and pawl assembly cannot slip or drop load.
3. Stops prevent spinning of handle if operator's hand slips off.

Nine Models — 1500 to 30,000 lbs. capacities. Write for bulletin E7SP

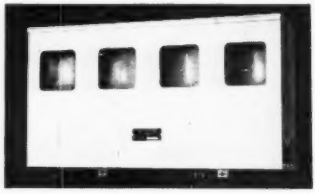
MIGHTY MIDGET pulls 500 lb., weighs only 6½ lb. Two-way handle is either a lever or high-speed crank. Ask for bulletin E7MP.

COFFING HOIST COMPANY • Danville, Ill.
QUIK-LIFT ELECTRIC HOIST—HOIST JACK—SPUR-GEARED HOISTS
DIFFERENTIAL CHAIN HOISTS—LOAD BINDERS

OUTDOOR METER BOXES

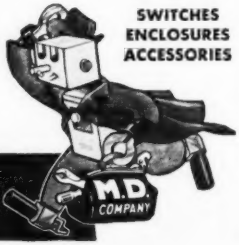
Your first cost is last cost on MD's OUTDOOR METER ENCLOSURES. Sturdy galvannealed steel, dull aluminum finish, hubs that won't rust, loosen or leak, all practical knockouts and conveniences are built into every size, style and price range we produce.

#7156
for single phase



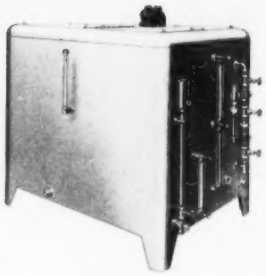
#29155
with 4 Test Blocks

Makers of the famous Roto-Test Switch, designers and creative engineers who work with YOU on every electrical metering, devices or methods problem.



SWITCHES
ENCLOSURES
ACCESSORIES

METER DEVICES
COMPANY • CANTON, OHIO



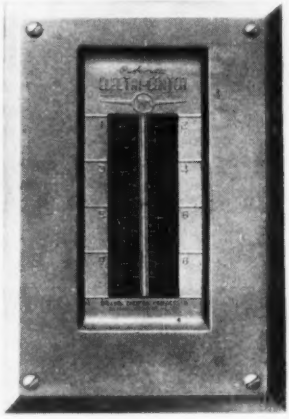
lud. It is available in four sizes for steam turbines with ratings from 1,000 to 110,000 kw.

Solid particles as small as 20 microns are said to be removed in the first step; the second step removes particles of 1 micron, as well as moisture. "Free water" is precipitated and ejected automatically. Absence of internal moving parts means no turbulence or aeration. Metallic contact is said to be prevented by a baked-on, corrosion-preventive sealer.

•

Circuit Control Cabinet

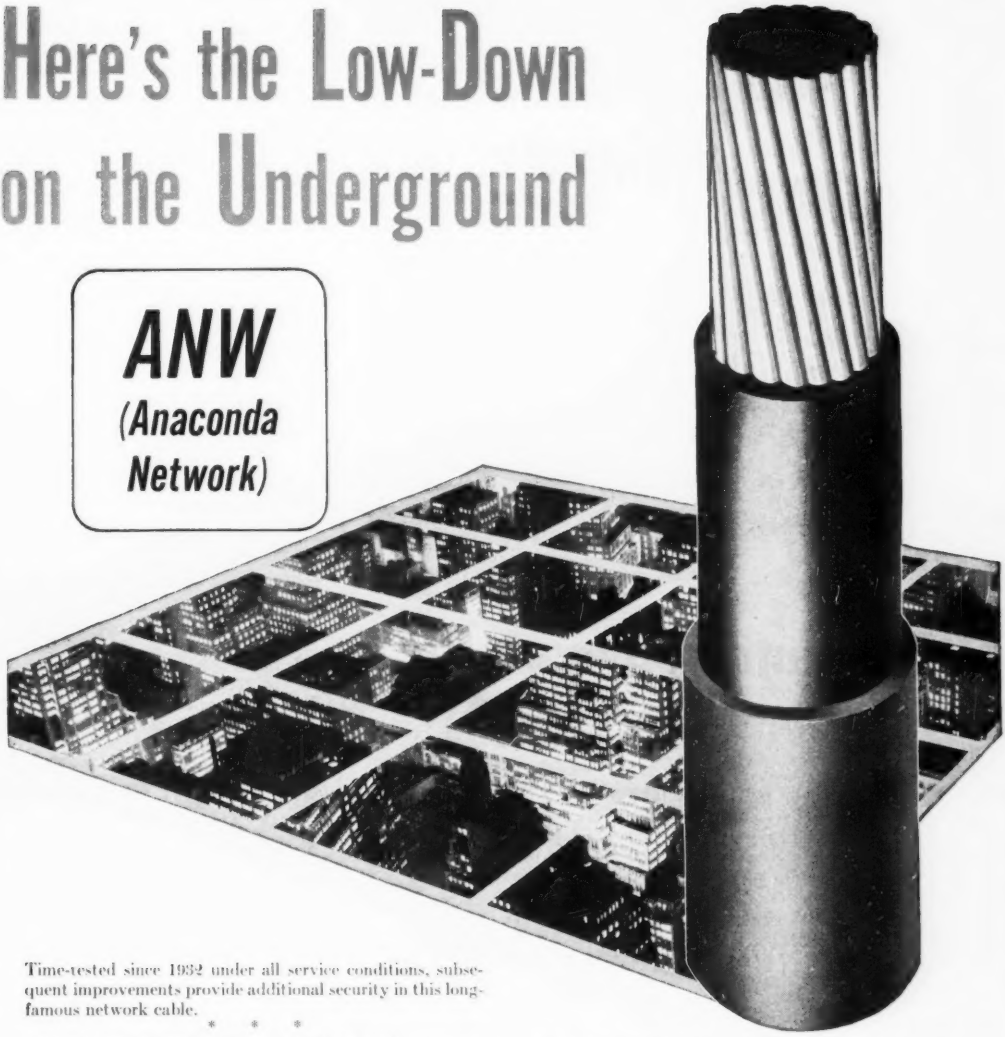
A MULTI-CIRCUIT control for homes, commercial buildings and industrial plants, the Pushmatic Service Electric-Center was recently introduced by Bull-Dog Electric Products, Box 177, Roosevelt Park Annex, Detroit 32, Mich.



Smaller than ordinary load centers, this cabinet is said to contain more wiring space. The Pushmatic makes or breaks circuits with a push of the finger. If power is cut off by short or overload, service is restored by the same push operation. Available in 2, 4 and 8-unit cabinets, these centers have UL approval.

Here's the Low-Down on the Underground

ANW (Anaconda Network)



Time-tested since 1932 under all service conditions, subsequent improvements provide additional security in this long-famous network cable.

* * *

Tough, easily handled, Type ANW-insulated, neoprene-jacketed cable incorporates six important advantages . . . important to you for underground duct installation.

1. Better heat and flame resistance—protected by the same neoprene jacket as Anaconda mining cables which must and do meet the severe flame test of the U.S. Bureau of Mines.

2. Higher resistance to duct acids and alkalies—years of experience with Type ANW insulation with only a braid covering showed it to be highly resistant to oils, acids and alkalies encountered in soil and sewage waters. NOW it has the additional protection of the neoprene jacket which itself has shown by test and experience, excellent resistance to these agents of destruction.

3. Higher operating temperature—now 75 C copper temperature, continuous duty.

4. Superior aging—Type ANW insulation has demonstrated year after year . . . and now even better . . . long-aging characteristics under severe oxygen bomb and air bomb tests.

5. Low Moisture absorption—Type ANW insulation has always had low moisture absorption . . . far less than is detrimental to safe operation.

6. More easily handled—passes 180 degree cold-bend test at 0° C without damage to jacket. Cable is lighter, easier to pull. No lead to fuse, insulation and jacket do not support combustion.

49444

ANACONDA

ANACONDA WIRE & CABLE COMPANY

25 Broadway, New York 4, N. Y.

may save you 150 Dollars!

49 CENTS MORE THAN AN UNTREATED CROSSARM . . . that's all the premium you pay to purchase the average crossarm that has been *pressure-treated* with Koppers Creosote . . . that has been protected against decay . . . that will last, on the average, about twice as long as an untreated arm.

Untreated fir crossarms usually last for only 15 or 20 years. Koppers Pressure-Creosoted Crossarms have a life expectancy similar to Koppers Full-Length Pressure-Creosoted Poles. Obviously, by using crossarms that last as long as poles, you can effect substantial savings.

That's not all! If an untreated crossarm, weakened by decay, goes out of service during a storm or at night, it may cost you as much as $150.00 to make the replacement. Not to mention the hazard to linemen . . . the interrupted service . . . the loss of revenue. Yes—from every point of view, it pays to purchase Koppers Pressure-Creosoted Crossarms.

Deliveries of Koppers Pressure-Creosoted Crossarms and Poles are made from conveniently located treating plants.

KOPPERS COMPANY, INC., Pittsburgh 19, Pa.

KOPPERS **PRESSURE-CREOSOTED WOOD**

MORE NEW PRODUCTS
about which you should know

The Gould Storage Battery Corp, Trenton 7, N. J., announces that all models of Kathanode and Thirty types of **industrial storage batteries** now include the new Z-plate positive grid which assures longer life and better electrical characteristics. . . . Unimatic Corp, 52 E. Centre St, Nutley, N. J., has introduced $\frac{3}{8}$-in. Harbot **connectors**, for attaching armored cable to knockout boxes, which protect wiring at point of entry and allow full use of box interior.

Electric Machinery Mfg Co, Minneapolis 13, Minn., produces two-pole, boiler feedwater **pump motors** of the squirrel-cage induction type, rated up to 1,250 hp, 3,600 rpm in drip-proof construction with pressure-lubricated bearings. . . . General Electric Co's Lamp Dept, Nela Park, Cleveland 12, Ohio, has developed a 3-kw **incandescent lamp** for stage spotlighting which takes standard a-c or d-c voltages; it is tubular in shape, 4 in. in diam and almost 1 ft long.

Irvington Varnish & Insulator Co, 6 Argyle Terrace, Irvington 11, N. J., has a **slot insulation** called Irv-O-Slot, which retains its bond after 288 hr at 150 C; available in varnished cambric bonded to fish paper or rag stock. . . . Roylyn Inc, 718 W. Wilson Ave, Glendale 3, Calif., manufactures a quick disconnect **electrical coupling** for all-weather and submarine use; it is known as the 1600 Series and is available in bronze alloys, aluminum alloy, or stainless steel in various sizes.

Square D Co, 6060 Rivard St, Detroit 11, Mich., announces a **voltage tester** with transparent, magnetic polarity cap for testing a-c voltages to 550 v and d-c voltages to 600 v. . . . Charles Bruning Co, Inc, 4754 Montrose Ave, Chicago 41, Ill., produces a **drafting instrument**, the Perspect-O-Metric, for drawing perspective views easily and accurately. . . . F. D. McGirr & Associates, 145 S. Elm Drive, Beverly Hills, Calif., has available the Shalda **measure meter** for measuring straight or curved distances in feet and tenths up to 10,000 ft; has telescoping handle and rubber-tired wheels.

Worthington Pump and Machinery Corp, Multi-V-Drive Sales Div, Box 953, Buffalo 5, N. Y., produces a **detachable V-belt**, Vee Ply, for emergency use on most V-belt drive applications; ease of coupling and adjusting to any length is described in Bulletin V-1500-B18. . . . Newman Mfg Co, 205 Westport Rd, Kansas City 2, Mo., has introduced a

lamp changer which removes and replaces fluorescent lamps without the use of ladders. . . . The Gould Storage Battery Corp, Trenton, N. J., has a translucent plastic **vent plug** called the Televel, for indicating water requirements of industrial storage batteries.

The General Detroit Corp, Detroit, Mich., has developed a **dry chemical extinguisher** which uses a fine white powder (bicarbonate of soda plus other chemicals to prevent caking) for electric, hydrocarbon and other surface burning fires. . . .The Hobart Brothers Co, Hobart Square, Troy, Ohio, is manufacturing Model TIH-200-S **a-c welder** for inert gas welding which has supplementary low heat control.

The Wilbur & Williams Co, Greenleaf and Leon Sts, Boston 15, Mass., offers an improved rust-inhibitive **paint primer** and finish coat called Totrust which features deeper penetration, high gloss and better weathering; supplied in seven colors including red, black and olive green. . . . Ideal Industries, Inc, 1021 Park Ave, Sycamore, Ill., manufactures a non-dusting and non-conducting **cleaning abrasive** in stick form for polishing commutators, slip rings and other metal objects of iron, steel and aluminum.

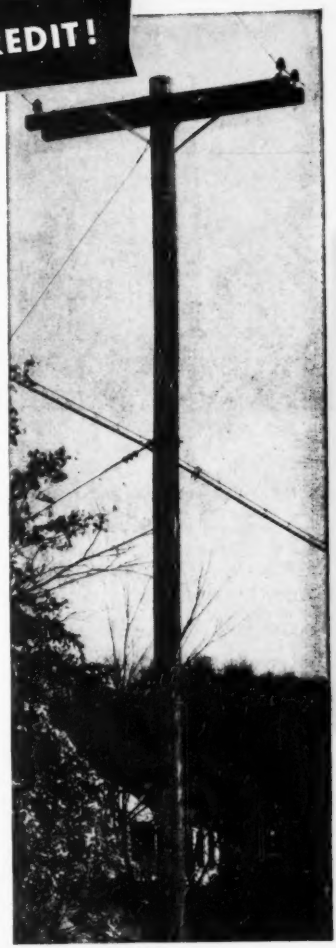
International Rectifier Corp, 6809 S. Victoria Ave, Los Angeles 43, Calif., has a line of selenium **dry-disk rectifiers** for battery charging and cathodic protection, suited for unattended service and locations where corrosive atmospheres and fumes are present. . . . General Electric Co's Construction Materials Dept, Bridgeport 2, Conn., will apply an **anti-corrosion jacket** to leaded cable whenever specified; covering is a taped (glass fabric), vulcanized neoprene hose jacket which effects a substantial reduction in total cable thickness.

A. B. Chance Co, Centralia, Mo., manufactures an **insulated oiler** for oiling high voltage switches, reclosers, etc, while they are energized; available on 4 and 6-ft laminated spruce poles, oiler holds $\frac{1}{8}$ pint of oil. . . . Westinghouse Electric Corp, Lamp Div, Bloomfield, N. J., announces a 300-w, heat-resistant R40 bulb, special service reflector **flood lamp** with a mogul screw base, rated at 115, 120 or 125 v.

Raytheon Mfg Co, Waltham 54, Mass., is marketing a fuse and **resistor clip** for electronic or electrical equipment to be used in places where excessive vibration is encountered; clips come in a variety of sizes. . . . Hayes Research Co, 687 Massachusetts Ave, Cambridge 39, Mass., has developed a thermoplastic resin **multi-purpose cement** called Dekadhese which is colorless, cold-setting, permanently flexible; has high dielectric strength and dry-film softening point of 230 F.

CASE HISTORY
confirms 30-year service life for treated poles

. . . AND CREOSOTE GETS THE CREDIT!



HERE'S a convincing case history* concerning 71 pressure-creosoted pine poles—part of an electric power transmission line erected in Kansas in 1917.

In 1947, after 30 years in line, 68 out of 71 poles were still sound and serviceable—furthermore, the inspection revealed that these poles appeared to be capable of service for some time to come. Of the remaining 3 poles, 2 had been removed because of line changes—1 had been damaged by lightning.

Of the original 71 poles, *not a single one had been removed because of decay*—a splendid testimonial to creosote. And all the more noteworthy when you consider that the preservative treatment used to protect these poles was somewhat lighter than is now regarded as good practice.

Creosote is the performance-proved, time-tested preservative for poles and crossarms. And for the best possible creosote delivery service, get in touch with the nation's largest distributor—Koppers. With 14 creosote-producing plants—with 4 large storage plants—Koppers can always meet your creosote requirements.

KOPPERS COMPANY, INC.
Pittsburgh 19, Pa.

*Wood Preserving News—1947

All Standard Specifications
For All Types of Wood Preservation

KOPPERS CREOSOTE...*to be sure*!

Time to re-live a memory?

Somewhere in every man's memory, half-hid by the veil of time, there's a scene like this. If it wasn't the thrill of catching your first fish, it might have been the day you first swam alone, or the day you first pulled the trigger of a shot gun, with somebody else shouldering the stock to absorb the kick. Exactly what it was doesn't matter. It was an unforgettable moment in your life.

Summertime makes those memories live again. A man wants to go back to those carefree, sunny days when a quick tug on the line, the old swimming hole, or a brand new fielder's glove was the only thing that mattered. So, you take a vacation. And you realize again that those simple pleasures, with the workaday world behind you, are almost as good as ever.

When you take your vacation this year remember that Ryerson stocks are again large and complete—and that service is immediate. Just tell the boys who pinch-hit for you while you're away to call our nearest plant for every steel requirement.

RYERSON STEEL

JOSEPH T. RYERSON & SON, INC. PLANTS AT: NEW YORK • BOSTON • PHILADELPHIA • DETROIT • CINCINNATI
CLEVELAND • PITTSBURGH • BUFFALO • CHICAGO • MILWAUKEE • ST. LOUIS • LOS ANGELES • SAN FRANCISCO

NEWS ABOUT PEOPLE

Texas Electric Elects Two New Vice-Presidents

Announcement has been made by the Texas Electric Service Co, Ft Worth, of the election of two new vice-presi-

BEEMAN FISHER

dents, Beeman Fisher, assistant to the president, and Perry Davis, manager of the Wichita Falls district.

Both Mr Fisher and Mr Davis have had many years' experience in the

PERRY DAVIS

electrical industry in Texas and have been associated with Texas Electric Service for more than 10 years.

•

Paul L. Howard has been appointed to the staff of the National Bureau of Standards, where he will conduct research in the electrochemistry laboratory, specializing in new types of primary and secondary batteries. Mr Howard was formerly vice-president in charge of electrochemical research of Graham, Growley and Associates, Inc. He has engaged in extensive research on all types of batteries for use by the Armed Forces and was instrumental in setting up the battery research and production programs during the war. He has also done research in radio electronics and organic, analytical, and electrochemistry.

•

J. R. Welsh Elected V-P of Shreveport Utility

J. Robert Welsh, superintendent of operations of the Southwestern Gas & Electric Co, Shreveport, La., has been

J. ROBERT WELSH

elected a vice-president of the company.

Mr Welsh has been associated with Southwestern since 1940, when he became superintendent of power. Five years ago he was appointed superintendent of operations and was elected to the board of directors in 1948.

Previously Mr Welsh had served as chief engineer of the L. E. Myers Co, with headquarters in Chicago.

•

Daryl C. Stephenson has been appointed chief field engineer for the B. C. Power Commission, Victoria, B. C. Mr Stephenson's former position of superintendent of the commission's costal region, with headquarters at Nanaimo, has been taken over by **Garth Griffiths.**

Seelye Receives Broader Engineering Assignment

Howard P. Seelye has been appointed chief engineer of the engineering department of the Detroit Edison Co and Edward R. Moore has been

HOWARD P. SEELYE

made assistant chief engineer of the department.

At the same time it was announced that the name system engineering, formerly designating the engineering group, is changed to engineering department and will consist of the planning, civil, electrical, and mechanical engineering divisions.

Mr Seelye became identified with the Detroit utility in 1916. Before his recent appointment he was chief electrical engineer in charge of the electrical section of the engineering division.

Mr Moore joined the Detroit Edison staff in 1926. Before his new assignment he was assistant to the chief engineer of the system.

•

Rolla E. Powers has joined the staff of Ebasco Services, Inc, New York, as consulting electrical engineer. Mr Powers was associated with the Westinghouse Electric Corp from 1923 to 1945. He was general engineer until 1936, active in central station design and operation. Subsequently he served as engineering manager of the eastern district and district manager of the manufacturing and repair division at

Chicago, in charge of manufacturing, engineering, purchasing, and labor relations, transferring to Emeryville as Pacific Coast manager in 1942 with similar functions. In 1943 Mr Powers was loaned to the Kellex Corp to act as a department head to design, construct, and place in operation the diffusion plant at Oak Ridge, Tenn., for separation of U235 from U238. More recently he served as project engineer for the Stanolind Oil & Gas Co.

Gerald Hulett has been appointed director of sales in the appliance division of F. L. Jacobs Co, Detroit. Prior to joining the Jacobs organization, Mr Hulett was vice-president in charge of sales for Electromaster, Inc, Mt Clemens, Mich. He started with Electromaster in 1930, serving successively as district manager, sales promotion manager, sales manager, and finally as vice-president in charge of sales. From 1937 to 1939 he was a regional manager for Bendix Home Appliances, Inc, South Bend., Inc., where he helped set up that company's national distributor organization before returning to Electromaster.

Donald Williams has been appointed director of sales of the Dow Chemical Co. In his new position, he succeeds Leland I. Doan, who recently became president. Mr Williams was formerly general sales manager. **Donald K. Ballman,** formerly assistant general sales manager, has been named general sales manager.

Everett Gilbert has been made vice-president for engineering at Radio Frequency Laboratories, Inc, Boonton, N. J. With RFL as special projects engineer since 1945, Mr Gilbert was previously employed by General Electric Co as a member of a development group on the Manhattan Project. His accomplishments at RFL include the development of a new electronic metal detector for processing lines.

Henry J. Leisenheimer has been appointed manager of export sales of the Electric Products Co, Cleveland. For years Mr Leisenheimer directed the export activities of the Cleveland Tractor Co. More recently, he served in the same capacity for the Hydraulic Press Manufacturing Co.

Sidney Ender, for the past 18 years president of Ender Manufacturing Co, New York, has sold his interest in that company and has joined Belmet Products, Inc, Brooklyn, as director of sales and development engineering for the lighting fixture trade.

F. L. Snyder Made Manager of Transformer Division

Frank L. Snyder, whose entire business career has been with the Westinghouse Electric Corp, has been appointed manager of the transformer division in Sharon, Pa. He succeeds John K. Hodnette, vice-president, who recently became general manager of industrial products with headquarters in Pittsburgh.

FRANK L. SNYDER

Formerly engineering manager for the division, Mr Snyder joined the Westinghouse transformer division in 1925 as a design engineer. Five years later he was made section engineer and, in 1940, division engineer. In 1942, Mr Snyder was named division engineer in charge of ordnance and played a major wartime role in the development of the electric torpedo. He became assistant engineering manager in 1945 and three months later was appointed engineering manager.

Succeeding Mr Snyder as transformer division engineering manager is **John H. Chiles, Jr,** who joined the company in 1925.

•

Dr J. C. Warner, dean of graduate studies and head of the chemistry department at Carnegie Institute of Technology, Pittsburgh, has been named president-elect to succeed Dr Robert E. Doherty, who will retire as Carnegie's president next year. Dr Warner will fill a newly created office of vice-president until his inauguration after Dr Doherty's retirement on July 1, 1950. Dr Warner has been associated with the Carnegie faculty for 23 years.

Bill Sharpe, manager of the division of advertising and news for the North Carolina State Department of Conservation and Development, has resigned, effective Aug 1, to become publicity director for the Carolina Power & Light Co. Mr Sharpe has had wide newspaper experience.

•

Public Service Assigns New Duties in Electric Dept

Several changes in organization in the electric department of the Public Service Electric & Gas Co, Newark, N. J., have been announced recently. They include:

Edmund J. Thimme, to be industrial relations manager.

Carlton L. Dudley, assistant general superintendent of distribution.

Oscar Bauhan, transmission and substation engineer.

Theodore Seely, division superintendent Essex division; **Joseph J. Glatzel,** superintendent, Passaic division; **Theodore G. Pierson,** assistant superintendent, Passaic division; **David E. McFarland,** distribution engineer, Passaic division.

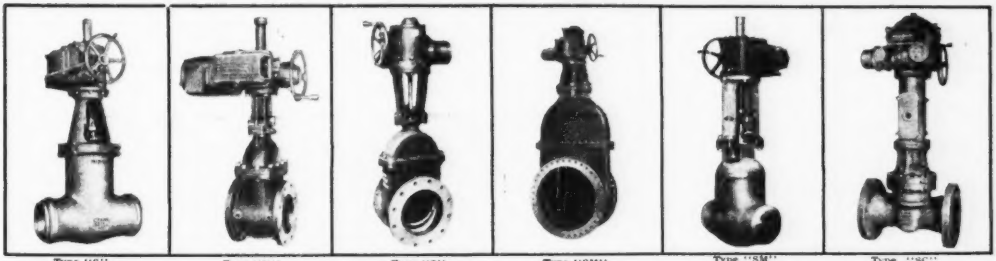
Mr Thimme joined Public Service in 1922 and has been superintendent of the Passaic division since 1945.

Mr Dudley started with the company in 1920. He served in the Essex division, in the general office, and in the Southern division before his appointment in 1942 as superintendent of the Essex division.

Mr Bauhan became identified with Public Service in 1923 in the New Brunswick district. Transferred to the general office in 1924, he served from then until 1942 as engineer and installation engineer working on the design and construction of substations and switching stations. Because of the large increase in industrial power demand following this country's entry into World War II, Mr Bauhan in 1942 was assigned the job of coordinating the engineering of Public Service facilities with the equipment of the various war industries. In 1945 he was made assistant transmission and substation engineer.

•

Joseph E. Thomas has been appointed chief engineer of power plants for West Penn Power Co at Pittsburgh. A 40-year veteran of West Penn's power organization, he will have entire responsibility for the engineering and expansion policies relating to power station construction and new power supplies. **William V. Drake,** manager of the power generation department of the Monongahela Power Co, Fairmont, W. Va., a West Penn affiliate, has rejoined West Penn as manager of power production in Pittsburgh. He will be



Type "S" LimiTorque on Crane Pressure-Seal Valve

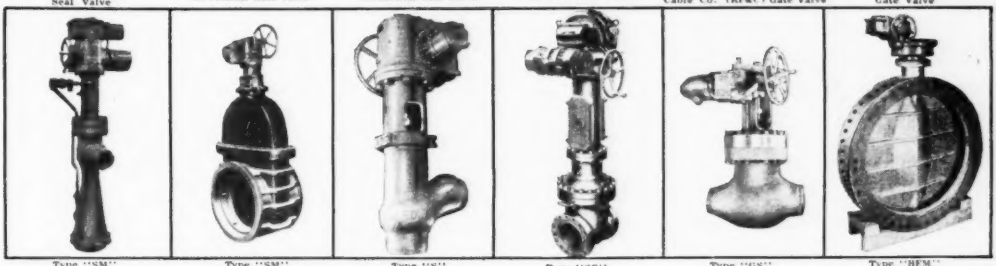
Type "M" LimiTorque on Jenkins Gate Valve

Type "S" LimiTorque on Darling Gate Valve

Type "SM" LimiTorque on Ludlow Gate Valve

Type "SM" LimiTorque on American Chain & Cable Co. (RP&C) Gate Valve

Type "S" LimiTorque on Crane Venturi Gate Valve



Type "SM" LimiTorque on Schutte & Koerting Reducing Valve

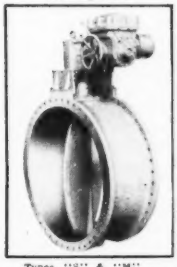
Type "SM" LimiTorque on Rensselaer Inside Screw Gate Valve

Type "S" LimiTorque on Edwards Angle Valve

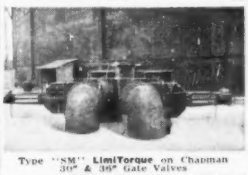
Type "SC" LimiTorque on Powell Gate Valve

Type "GS" LimiTorque on Edwards Butler Non-Return Valve

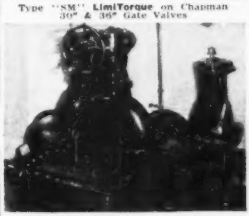
Type "BFM" LimiTorque on Phillips (Henry Pratt Co.) Butterfly Valve



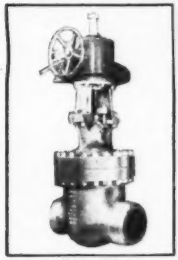
Types "S" & "M" LimiTorque on R-S Butterfly Valve (in tandem operation)



Type "SM" LimiTorque on Chapman 30" & 36" Gate Valves



Type "M" LimiTorque on 24" Iowa Gate Valve



Type "S" LimiTorque on Walworth Valve

Limitorque

MOTOR-OPERATED VALVE CONTROLS

. . . are widely used on many different makes of valves

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directly responsible for the operation and maintenance of all power stations. Mr Drake originally joined West Penn in 1922, transferring to Monongahela six years later. **Gilbert D. Burleigh,** superintendent of the Mitchell power station, has transferred to the Monongahela Power Co at Fairmont. He will direct the work of the West Virginia utility's power generation department. The new superintendent at Mitchell power station is **Robert E. Weber,** advanced from the position of supervisor of maintenance there.

•

Philco Announces New Executive Appointments

James T. Buckley, who was president of Philco Corp, Philadelphia, from 1939 to 1943, and has since served as chairman of the executive committee, has been elected chairman of the board of directors to succeed the late John Ballantyne. William Balderston, president of the company, will continue to serve in that capacity as the chief executive officer of Philco. Mr Buckley joined Philco in 1912 and has spent his entire business career with the company.

James H. Carmine, vice-president-distribution for the past two years, has been elected executive vice-president. A nationally known figure in the appliance industry, Mr Carmine has played a leading part in the growth and expansion of Philco. He joined the organization in 1923.

Leslie J. Woods, who has a long record of commercial engineering experience in the electronics industry as a member of the Philco organization, has been appointed vice-president-director of research and engineering to direct all engineering and research activities of the corporation. Mr Woods joined Philco in 1925.

•

Ellis C. Yale has been appointed a special assistant to Joseph H. Ward, executive vice-president of Noma Electric Corp, New York. Mr Yale was formerly associated with the Lamp Division of the General Electric Co. He has had intensive sales development experience in both the automotive and aviation fields.

F. S. Cornell has been named assistant manager of the water heater division of the A. O. Smith Corp, Milwaukee. Mr Cornell became thoroughly familiar with all phases of the company's operation during the war, when as a major in the Air Force he acted as the contracting and terminations officer. Since the war, Mr Cornell has served as assistant to W. C. Heath, president, and has thus been in close touch with the development of all of the company's postwar policies and planning. Prior to the war, he was a member of the New York Stock Exchange for 13 years, and engaged in the investment banking business.

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INDIANA STEEL & WIRE CO.
MUNCIE, INDIANA

Louis S. Morse, Sr. executive engineer of York Corp, recently became the first honorary member to be elected by the Air Conditioning and Refrigerating Machinery Association. As advisory engineer to the association's general standards committee for many years, Mr Morse has been particularly active in the development of ACRMA's equipment standardization program.

Robert L. Haizlip has been appointed sales manager of the Electrical Manufacturing Co, Battle Creek, Mich. Mr Haizlip has had many years of experience in actual line construction and more recently in the sales department of Line Material Co and as sales manager of the Utilities department of Hughes Supply, Inc., Orlando, Fla.

Knute Knutson, vice-president of the Barron County Electric Cooperatives, Barron, Wis., since its organization in 1936, has succeeded to the presidency upon the resignation of **John E. Olson,** who was recently elected to the state senate in a special election. Mr Olson was formerly also secretary-treasurer of the Wisconsin Electric Cooperative.

J. B. Markham has been appointed manager of the Fayetteville, Tenn., electric distribution system operated by the Fayetteville Power Board. Mr Markham succeeds the late Walter J. Dunn.

Karl Philippi, Schenectady, has been made manager of the electronics and merchandise division of IGE, with headquarters in New York.

OBITUARY

Cecil M. Munoz, formerly president and chairman of the board of the electrical engineering firm of Harry Alexander, Inc, of New York and Washington, D. C., died at his home in Pacific Palisades, Calif., on July 6. He was 64 years old.

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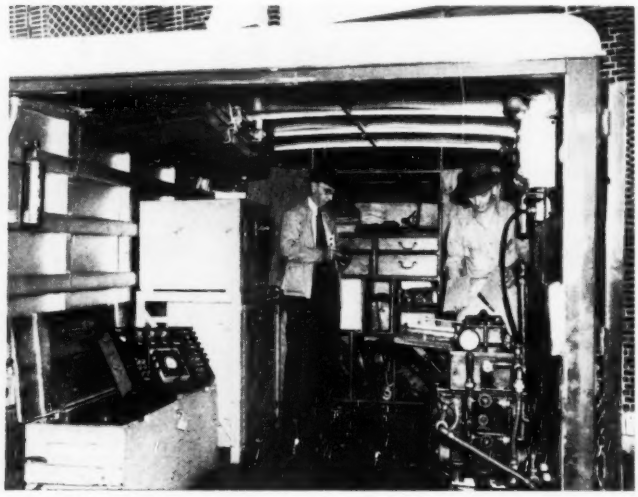


VERSATILE enough to permit its three-man-crew to work on any type of breaker, this specially-equipped, one-and-a-half ton GE circuit breaker truck used for maintenance has been put into service by the City of Jacksonville, Fla. The equipment mounted inside the truck includes a 7" filter press and a four-compartment oven for drying filter press paper. It also has an oil tester for testing the dielectric strength of insulating oil, a synchronous timer, and two run-off reels providing 125 ft of three-conductor cable, all General Electric manufactured. The truck furnishes either 110 or 220-v single-phase service for operating the equipment and light for night work is provided. A 3-kva, 35,000-v test set is available for high potential tests

RFC Lends Funds to Small Electrical Manufacturers

Some small electrical equipment manufacturers that can no longer finance themselves through regular credit channels have been hurrying to the Reconstruction Finance Corporation. Most of these and other applicants are getting loans.

Through the last three months for which figures are available—February, March and April—applicants for RFC loans from all industry average 838 a month, about 40% above the monthly average for all of 1948.

In dollar terms, the rise has been even sharper; borrowers are now asking for twice as much as they did last year—about $120-million a month.

Electrical equipment manufacturers alone have asked for 40 loans during the same months. The total amount involved was $5,819,226.

Right now RFC is granting about three fourths of all applications. This is an abnormally high proportion, but at this point in the business cycle a large share of the would-be borrowers represent what would normally be pretty fair risks, temporarily strapped for capital. Some firms in otherwise robust financial condition want new capital for legitimate expansion. And they don't think they can get it by security flotation—the market being what it is today. Other firms have permitted growing inventories to tie up too much working capital. Though by no means insolvent, they are in urgent need of cash. But more and more the banks are saying no to their requests.

Naturally, most of RFC's customers are small and their needs are small. That's why 90% of the loans RFC makes are for $100,000 or less; 65% are for less than $25,000; 25% are under $5,000. But it is these smaller firms which find it harder to finance themselves.

General Electric Profits Down for 1st Half of 1949

Profits of General Electric Co are going down. For the first half of 1949, profits available for dividends were $46,552,842 or 5.8¢ per dollar of sales and $1.61 a share of common stock. For the first half of 1948 the corresponding figures were $54,602,339, 7.1¢, and $1.89.

Consolidated net sales for the first half of 1949 were $801,756,516 or 4% more than the $772,761,792 billed in the first half of 1948.

Charles E. Wilson, company president, said the decreased earnings "resulted principally from reductions in our selling prices and from the adverse effect on our margins of frequent adjustments made in our production schedules in an attempt to maintain a reasonable balance between output and the erratic, but generally reduced, demand for certain products, notably appliances and equipment for industrial applications."

•

Manufacturers Make New Sales Assignments

Electrical manufacturing companies have recently made several appointments to their sales staffs.

Larkin Transformer Division, Larkin Lectro Products Corp, New York, has appointed Gordon Hammond Co, Hopkinton, N. H., representative in the New England States; L.C.R. Sales Co, 402 Nalle Bldg, Austin, representative in Texas, Oklahoma and Louisiana; and the Bradley Co, 101 North 33d St, Philadelphia, representative in Pennsylvania, Delaware, Maryland, Washington, D. C., and Virginia.

C. P. Clare & Co, Chicago, has appointed Albert M. Baehr representative in Ohio with offices at 11621 Detroit Ave, Cleveland 2.

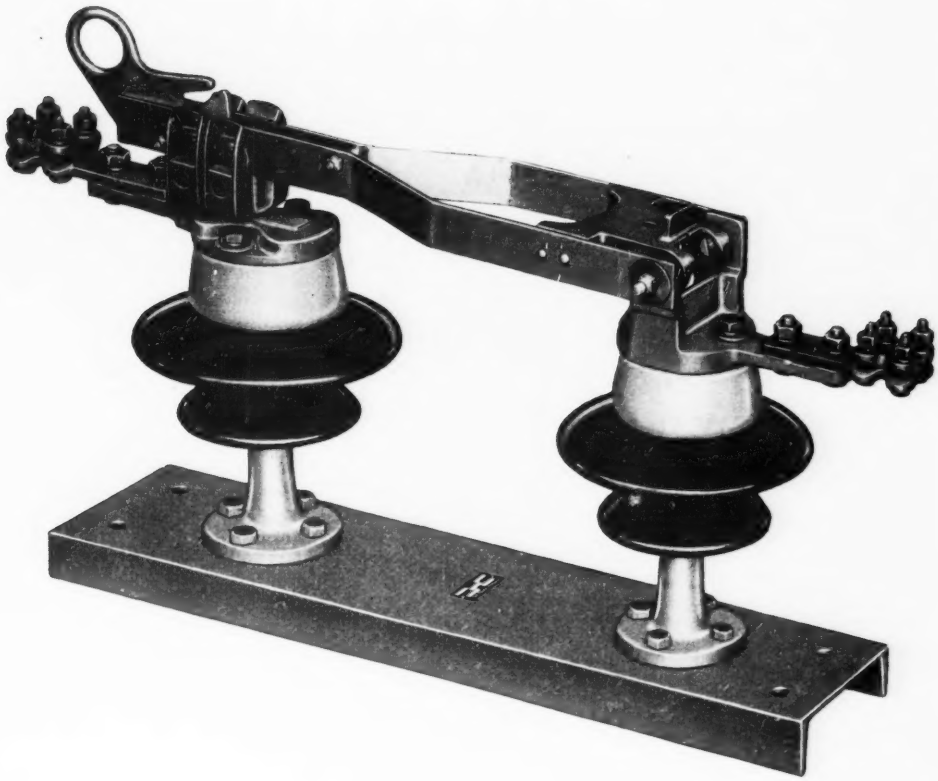
Cutler-Hammer, Inc, Milwaukee, has announced the opening of a sales office at 504 Broadway, Gary, Ind., to meet the expanding need for its products in the area. F. J. Burd will manage the office as a branch of the Chicago district sales office. H. Kolar will assist Mr. Burd in handling the sales work in this territory.

McGraw Electric Co, Elgin, Ill., has appointed B. S. Green III sales representative for the Toastmaster Products Division in southern California. He will operate

Cole Electric Co.

8439 Steller Drive — Culver City, Calif.

TExas 0-4701



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HEADQUARTERS FOR BUSINESS INFORMATION

McGRAW-HILL publications

from the Los Angeles district office under K. E. Campbell, district manager. Donald D. Hutchins has been made sales representative for the St. Louis territory, which includes most of the Central-southern states, with headquarters in St. Louis, Mo.

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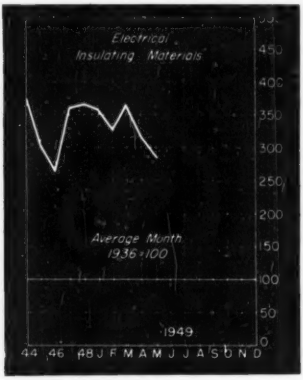
Insulating Materials Sales Move Downward in May

Sales billed on electrical insulating materials during the month of May, 1949, decreased from the April total,



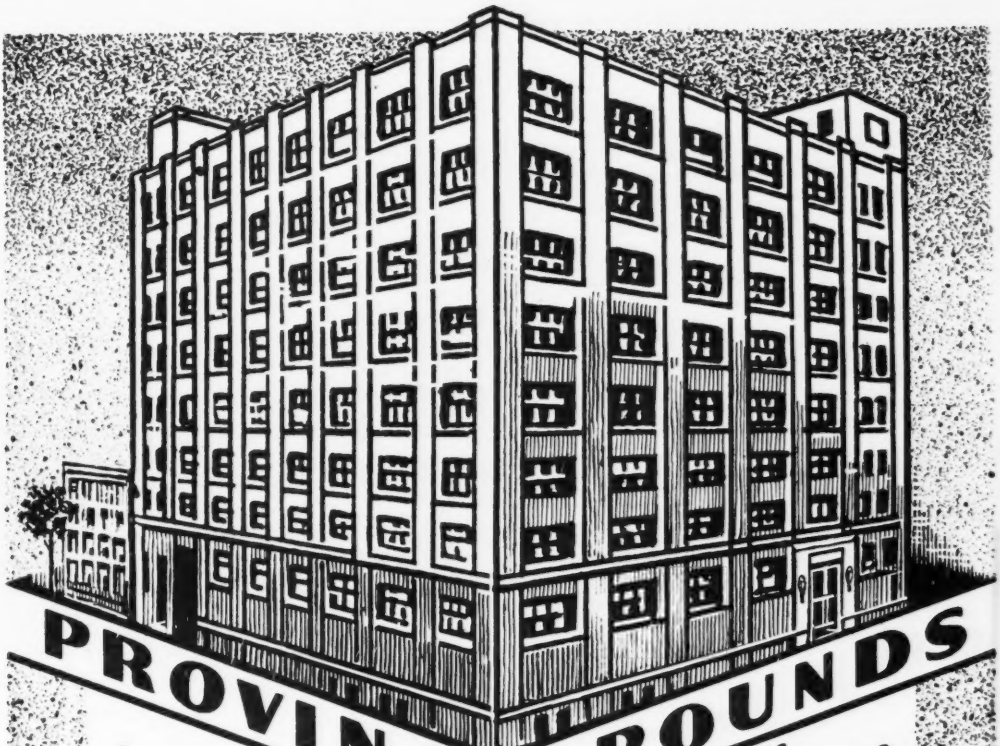
according to figures released by the National Electrical Manufacturers Association. The NEMA index moved downward to 285 from 315 in April, a drop of 10%.

In May, 1948, the index stood at 344, this year's figure representing a decrease of 17%.

MANUFACTURING BRIEFS

A new laboratory associated with the R. S. Crawford Memorial Institute Research Fellowship has been established at M.I.T. Research in the field of rubber and plastic materials will be its objective. These facilities are being provided by the Elastic Colloid Research Corp. with which are associated ten national manufacturers of rubber products. Manufacturers of cable have indicated their interest. Dr Ernst A. Hauser has been named director of the laboratory.

An Alcoa engineering party will arrive soon in Skagway, Alaska, to continue investigative work dealing with proposed establishment of a $300-million metallurgical industry in that area, the Alaska Development Board has announced at Juneau. Dr Warren J. Mead, head of the geology department at M.I.T., will head the party.



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UTILITIES

Proposed Construction

Arizona and Nevada—Bureau Reclamation, Dpt. Interior, Davis Dam, Nev., furnishing labor and materials and performing work for installation of electrical and hydraulic machinery and appurtenant equip., and erection of steel structures for Davis Dam, Power Plant and switchyard, Davis Dam Proj. about 30 mi. west of Kingman, Spec. 2733. Michael W. Straus, comr.

Arizona-Nevada—Bureau Reclamation, Dpt. Interior, Bldg. 1-A, Denver Federal Center, Denver, Colo., furnish and del. f.o.b. cars at shipping point or f.o.b. cars at Coolidge, Mesa, Prescott, Tuscon, Cochise, Eloy and Phoenix, Ariz., main control boards, indoor unit substation for Coolidge substation; telemetering equip., transmitter - receiver sets, distribution transformer, for Coolidge, Prescott, Mesa, E. D. No. 5, Tuscon and Cochise substations and Phoenix dispatching office, Davis Dam Proj., Spec. 2734. L. N. McClellan, ch. engr.

Arizona - California - Nevada — Bureau Reclamation, Dpt. Interior, Bldg. 1-A, Denver Federal Center, Denver, Colo., generator for Unit A-9 at Hoover Power Plant, Boulder Canyon Proj., Spec. 2735; furnish. and del. f.o.b. cars at shipping point or f.o.b. cars at Boulder City, Nev., hydraulic turbine with pressure regulator for unit a-9 in Hoover Power Plant, Boulder Canyon Proj., Spec. 2737; furnish. and del. f.o.b. cars at shipping point or f.o.b. cars at Boulder City, Nev., power transformers for Unit A-9 Hoover Power Plant, Canyon Proj., Spec. 2736. L. N. McClellan, ch. engr.

Ind., Fort Wayne—Bd. P. Wks., Walter Vetter, pres., City Hall, municipal power plant imprvs., incl. generating station, steel plate generator cooling air duct, steam and exhaust piping, oil and water piping etc. $300,000. Emery, Marker & Emery, 510 Toledo Trust Bldg., Toledo, O., consult. engrs.

Iowa—Monona County Rural Electric Co-operative, Onawa, 168, 2 mi. rural distr. lines, 9.61 mi. secondary and service lines, 31.35 mi. conversion lines, Monona, Crawford and Woodbury Counties. Proj. Iowa 16H&K, Monona. Plans deposit $25. Brown Engrg. Co., 326 K. P. Bldg., Des Moines, engr.

Ia., Creston — Southwestern Federated Power Co-operative, Creston, Sect. 7, incl. steam plant bldg., drainage, bldg. alterations, etc., Sect. 8, electrical work, power plant, Stanley Engrg. Co., Hershey Bldg., Muscatine, engr.

Kentucky—U. S. Eng., 303 U. S. Court House, Nashville, Zone 1, Tenn., 270,000 KW Wolf Creek Hydroelectric Power Plant, mile 460.9 on Cumberland River, approx. 10 mi. north of Albany, Russel Co., Serial No. CIVENG-40-058-50-3.

Missouri—Ozark Border Electric Co-operative, Poplar Bluff, 600 mi. rural distr. lines, sys. imprvs., 22 mi. transmission lines, 29 mi. tie lines, two way radio, Stoddard, Dunklin, Mississippi, New Madrid, Cape Girardeau, Scott and Bollinger Counties, **$1,325,000.** Stanley Engrg. Co., Muscatine, Ia., engrs.

Nebraska — Bureau Reclamation, Dpt. Interior, Denver Federal Center, Denver, Colo., one 1,500 kva. unit type substation for Narrows Dam substation, Missouri River Basin Proj. (Region 7). South Platte Div. Spec. R7-65.

N. C., Morgantown — at office A. P. Smith, Bus. Mgr., State Hospital, Morgantown, construct steam generating equip., feederwater heater, boiler feed pumps, electric generating equip. and electrical switchboard at State Hospital, Wiley & Wilson, American Bldg., Richmond, engrs.

Oregon — U. S. Eng., Pittock Block, Portland, Zone 5, furnish, install, test two 55,555 kva a.c. generators and appurtenances for Detroit Dam on North Santiam River, **$2,000,000.**

Tex., Bryan—City, Roland C. Dansby, mayor, City Hall, installing 5,000 kw steam turbine and generator, electric power plant, **$700,000**; electric distr. sys. addns., **$100,000.** Thomas Bryan & Assoc., M. & M. Bldg., Houstor., engrs.

Low Bidders & Contracts Awarded

Ariz., Flagstaff—State College, Flagstaff, central heating and power plant for State College, to W. S. Ford Constr. Co., Flagstaff, **$490,000.** Awarded 7/8.

Ariz., Phoenix—City, Phoenix, modernization of city fire alarm sys., installing 493 new boxed, reconditioning 145 present boxes and constructing central fire-alarm sys. headquarters, from Gamewell Co., Newport Upper Falls, Mass., **$678,799.**

Ill., Chicago—Commonwealth Edison, 72 W. Adams St., Zone 3, sub station, 6328 Northwest Highway, to Herlihy Mid-Continent Co., 79 W. Monroe St., Zone 3, **$68,000.** Shaw Metz & Dolio, 208 S. LaSalle St., Zone 4, archts. Awarded 7/8.

Kansas—The Northwest Kansas Electric Co-operative Assn., Inc., Mack Linn, mgr., Bird City, 46 mi. service extens., along C section single phase, Cheyenne and Rawlins Counties, also headquarters bldg., force account, **$200,000.** W. H. Burgwin, Fredonia, engr.

Kansas—Victory Electric Co-operative, Roy Marler, mgr., Dodge City, July 29, 380.5 mi. rural distr. lines, 167.25 mi. conversion line, Ford Co., from J. & J. Constr. Co., First National Bank Bldg., Oklahoma City, Okla., **$406,742.** Est. $350,000.

Missouri—Intercounty Electric Co-operative, J. J. Bowles, pres., Licking, 389.52 mi. rural distr. lines, 21.5 mi. conversion work, Maries, Gasconade, Phelps, Crawford, Dent, Texas and Shanhon Counties, Proj. Missouri 18 F-1 M & P. Phelps, to Reinhart & Donovan Co., 116 N. W. First St., Oklahoma City 2, Okla., **$589.000.** Bids 6/9.

Montana—Bureau Reclamation, Dpt. Interior, Fort Peck, July 12, Williston Substation, approx. 4.5 mi. west of Williston, Fort Peck Proj., Spec. 2703, from Killoran Electric Co., Appleton, Wis., **$168,418.**

Nebraska—Southwest Electric Membership Corp., Paliside, rural distr. lines, Sect. 1, Nebraska 86-B-C, Dundy, Hitchcock, Dundy, Chase, Hayes and Red Willow Counties, to W. B. Lindsey, Lindsey Constr. Co., 115 16 Ave. N., Nashville, Tenn., **$435,826.** Bids 7/6, awarded 7/11.

North Carolina — Tri-County Electric Membership Corp., Goldsboro, July 8, 200 mi. rural distr. lines, Wayne Co., from Durham Electric Constr. Co., Durham, **$231,706.**

South Carolina—York County Electric Corp., York, rural distr. lines, York Co., etc., to E. C. Bridges, Heath Springs, **$73,526.** Bids 7/6.

Tex., Austin—City, City Hall, July 12, rein.-con. fdn. and bsmnt., for electric power plant from E. B. Snead, Balcones Trail, Prop. 1, **$86,900** and Prop. 3, **$96,200.** Burns & Mc Donnell Engr. Co., 95 and Troost Sts., Kansas City, Mo., engrs.

Wis., New Richmond—St. Croix Co., New Richmond, July 18, general contract power house and tunnel at County Hospital, from Fred O. Watson, 450 Baker Bldg., Minneapolis, Minn., **$78,000.**

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Proposed Construction

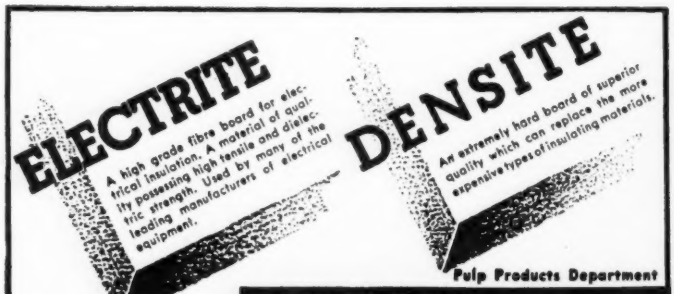
N. C., Chapel Hill—University of North Carolina, Chapel Hill, hospital alterations and addns. to Medical School incl. nurses home. Approx. **$6,000,000.** Plans deposit $50. Northrup & O'Brien, Reynolds Office Bldg., Winston-Salem, archts.

Tex., San Antonio—Pan-American Cancer Foundation, c/o Dr. Dudley Jackson, pres., Nix. Prof. Bldg., 250 bed cancer research and treatment center hospital, **$2,250,000.**

Low Bidders & Contracts Awarded

Minn., Minneapolis — Donovan Constr. Co., 1725 Carroll Ave., St. Paul, 58 unit housing, Excelsior Blvd., opposite Meadowbrook Golf course, owner builds, **$6,000,000.** P. Crosier & Son, 2441 Lyndale Ave. S., archts.

Pa., Phila.—E. I. du Pont de Nemours & Co., Inc., Nemours Bldg., Wilmington, Del., research laboratory to Wark & Co., 1700 Sansom St., **$1,500,000.**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LETTERS TO THE EDITOR

Felicitations

To the Editor of ELECTRICAL WORLD:

The May 7th issue of ELECTRICAL WORLD has been received and read.

I, who believe that I am one of the youngest, if not the youngest, oldest subscriber to the ELECTRICAL WORLD and its predecessors, take pleasure in congratulating you on the $^{3}/_{4}$-century mark.

I started to take the magazine (was it the *ELECTRICAL WORLD* and *ENGINEER*?) in 1902, and I think if you check the records, you will find I have been a continuous subscriber since then, with the exception of the two years when I was in college, at which time the extra $6 saving made possible by looking at the magazine in the college library was a matter of real financial importance.

In your morgue or in some "Who's Who" you might find I was born in 1890, and, therefore, started taking ELECTRICAL WORLD when I was 12 years old.

Therefore, if etiquette permits a youngster of only 59, who has been interested and has regularly read your magazine for the last 47 years, to do so, may I wish you a prosperous remainder of the century.

E. A. Armstrong
Manager Industrial Sales
Public Service Co. of Northern Ill.
Chicago, Illinois

REA

To the Editor of ELECTRICAL WORLD:

The closing paragraph in your February 19th discussion of AT&T and REA competition is worded:

"Issue underlying the fight in Congress (on the Poage Bill) is whether the government has a social obligation to provide telephone service as much as electric power."

Under the Laws of the U S, I know of no obligation, expressed or implied, that the Congress is required to provide the luxuries of civilization to dwellers in the hinterlands. From your statement, one might assume that you have joined the school of thought which holds that the Federal Government is obligated to provide electric power for everyone. (And, incidentally it may be assumed, to build a sanitary WPA privy for every rural family and to finance the wiping of every infant's nose.)

As early as 1933, when REA was born, the fact was faced that the preponderance of farms within reach of electrical transmission lines had been served. Subsequently, REA introduced new, and lowered, standards of distribution which sometimes made the serving of two customers per mile economically feasible. Some of these lowered standards were followed by privately owned utilities, and as we look back over the past 15 years it is found that more than half the farm electrification accomplished in that time has been by the privately owned companies.

Now, facing a saturated market, REA Alexander seeks more worlds to conquer. Not only is a need alleged to serve potential customers in low population density areas; the bureaucracy decides that the amortization period should be long enough to allow two distribution systems to wear out before one is paid for.

Other Fields are Entered

Also, to maintain a top-heavy organization, the two foreign fields of Generation and Transmission are entered into, even though the requisite power is available to Distribution Cooperatives from established utilities, and at lower rates.

Perhaps your editorial policy is correct in offering a fair hearing to publicly financed power projects. Have you never noted, however, how every proponent of public power shadow-boxes with the "Power Trust?" Each eager little Bureaucrat urges limitless Federal aid for his own pet project, whether it be REA generation, New Johnsonville, or Department of Interior power developments.

Without recourse to the record, all are unanimous that they are being persecuted, and uninformed Congresses continue to make appropriations to support these parasitical power-mongers. The alleged persecution of public power by privately owned power companies is reminiscent of the fellow-travelers' complaints against Wall Street and the War Mongers.

It is high time that the business publications of the Nation come to a decision concerning the side on which their bread is buttered. Private power and public power cannot survive side by side while the latter has an unobstructed pipe-line to the U S Treasury.

Privately owned utilities have achieved a level of management and efficiency of operation which no Governmental enterprise can hope to rival. Shall this accomplishment be liquidated at the behest of "bright young men" whose utilities operating experience is non-existent, and whose only God is socialized power at any cost?

E. F. Downs
Chicago, Illinois

CATALOGS • BULLETINS

● POLES: "How to Keep Your Poles Up and Costs Down" is the title of a new eight-page booklet which describes groundline inspection and maintenance service. Osmose Wood Preserving Co of America, Inc, 1437 Bailey Ave, Buffalo 12, N. Y.

● ELECTRIC HEATING: A 20-page illustrated booklet (Bulletin 103) describes units and gives data on pipe-fitting heaters, molded-terminal and lug-terminal tubular heaters, air heaters, automatic and non-automatic water heating elements with flange and pipe-fitting mounts, relays, and several types of thermostats. Temperature conversion tables, an application guide and information on special-purpose heating units are added features of the new publication. Electro-Therm, Inc, 8024 Georgia Ave, Silver Spring, Md.

● SWITCHGEAR: A new 12-page, two-color booklet 4200-PRD-194 describes switchgear for single and paralleled generator installations at voltages from 120 to 5000 v. Construction features are illustrated and described; specifications listed and connection diagrams given for generator panels, synchronizing panels, feeder panels, and distribution panels; and installations in utility and industrial power plants illustrated. Electric Machinery Mfg Co, Minneapolis 13, Minn.

● TRANSFORMERS: Catalog 349 shows how the Pole Star transformer is constructed from beginning to end, and includes detailed information on coils, core frames, lead assembly, tank, bushings, final assembly, mounting, crating and shipping. Pennsylvania Transformer Co, Box 6208, Pittsburgh 12, Pa.

● LIGHTING: Facts about fluorescents and incandescents have been boiled down into concise, easy-to-find information in a new pocket Catalog 46-A. In addition, the catalog introduces several new items: Guthlite, Jr.; new G-S-T's; hinged eggcrate Aristolites; "Jacknife" troffers; new Mazelite and the "Top Hat" reflectors. The Edwin F. Guth Co, 2615 Washington Blvd, St. Louis 3, Mo.

● LADDERS: All-aluminum utility and industrial ladders, including specifications, are described in a 16-page well-illustrated bulletin. A separate section is devoted to safety shoes. Approved by the Departments of Labor and State Industrial Commissions, these rugged safety shoes can be instantly converted from rubber soled shoes for inside use, to rugged spiked toes for use on the ground. Duo-Safety Ladder Corp, 809-11-13 Ninth St, Oshkosh, Wis.

SEARCHLIGHT SECTION

EMPLOYMENT • BUSINESS • OPPORTUNITIES • EQUIPMENT—USED or RESALE

UNDISPLAYED RATE:
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$1.20 a line, minimum 4 lines.
In figure advance payment count 5 average words as a line.
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BOX NUMBERS care publication New York, Chicago or San Francisco offices. Count as 1 line additional in undisplayed ads.

DISCOUNT of 10% if full payment is made in advance for four consecutive insertions of undisplayed ads (not including proposals.)

DISPLAYED RATE:
The advertising rate is $9.75 per inch for all advertising appearing on other than a contract basis. Contract rates quoted on request.

AN ADVERTISING INCH is measured ⅞ inch vertically on one column, 3 columns—30 inches —to a page. E. W.

NEW ADVERTISEMENTS received by 10 A. M. August 5th, will appear in the August 13th issue subject to limitations of space available.

Wanted by Manufacturer

Experienced man to handle sales correspondence and quotations on distribution and power transformers. Should have pleasing sales personality, be an electrical engineering graduate, and have actual sales experience.

P-9373, Electrical World
330 W. 42nd St., New York 18, N. Y.

REPLIES (Box No.): Address to office nearest you
NEW YORK: 330 W. 42nd St. (18)
CHICAGO: 520 N. Michigan Ave. (11)
SAN FRANCISCO: 68 Post St. (4)

POSITIONS VACANT

ENGINEER FOR Georgia Electric Membership Corporation qualified to head department, must be eligible for registration; experienced in distribution, operation and planning both rural and urban construction; under 40 years of age and with iniative. State briefly qualifications and salary expected in first letter. P-9178, Electrical World.

SELLING OPPORTUNITY OFFERED

ESTABLISHED LINE of Power and Distribution Transformers, Southeast, New England, and Mid-West territories available. RW-9218, Electrical World.

EMPLOYMENT SERVICES

SALARIED POSITIONS $3,500-$35,000. If you are considering a new connection communicate with the undersigned. We offer the original personal employment service (39 years recognized standing and reputation). The procedure is highest ethical standards, is individualized to your personal requirements and develops overtures without initiative on your part. Your identity covered and present positions protected. Send only name and address for details. R. W. Bixby, Inc., 262 Dun Bldg., Buffalo 2, N. Y.

POSITIONS WANTED

ENGINEER. (GRADUATED electrical-mechanical) 30 years in all branches. Field and office. Consultant, Supervisor, Liaison on large construction projects handling utilities and building construction of communities efficiently. Also survey and reports on Foreign Nations power and industrial exploitation. Anywhere home or abroad. Physically perfect. Age 54 years min. 9000 and up in accordance with location. Highest references possible. Present contract expires September. J. Slingerland, Pleasantville, New York, Phone 2393.

GRADUATE ELECTRICAL Engineer, registered P.E., 38, married. Experience: 1 yr. generation operation; 9 yrs. transmission and distribution operation, maintaining, planning, design, construction; 2 yrs. inventory. Locate here or abroad. PW-9490, Electrical World.

U. S. Government

UNITED STATES DEPARTMENT OF THE INTERIOR, Bureau of Reclamation. Sealed bids (Specifications No. 2735) will be received by Bureau of Reclamation, Denver, Colorado, August 16, 1949, and then publicly opened for furnishing and installing one 62,500-kva, 80-percent power-factor, 257-rpm, 13,800-volt, 3-phase, 60-cycle, vertical-shaft, alternating-current generator for unit A-9, Hoover Power Plant, Boulder Canyon Project, Arizona-California-Nevada. Completion of installation is desired within 1,000 days, or as much earlier as possible. For particulars, address Bureau of Reclamation, Building 1-A, Denver Federal Center, Denver, Colorado.

MICHAEL W. STRAUS, Commissioner. (103)

UNITED STATES DEPARTMENT OF THE INTERIOR, Bureau of Reclamation. Sealed bids (Specifications No. 2736) will be received by Bureau of Reclamation, Denver, Colorado, August 16, 1949, and then publicly opened for furnishing four 21,000-kva., 13,600-delta- to 69,000-wye-volt, single-phase, forced-oil-cooled, outdoor, power transformers for Unit A-9, Hoover Power Plant, Boulder Canyon Project, Arizona-California-Nevada. Delivery is desired within 900 days. For particulars, address Bureau of Reclamation, Building 1-A, Denver Federal Center, Denver, Colorado.

MICHAEL W. STRAUS, Commissioner. (102)

UNITED STATES DEPARTMENT OF THE INTERIOR, Bureau of Reclamation. Sealed bids (Specifications No. 2734) will be received by Bureau of Reclamation, Denver, Colorado, August 30, 1949, and then publicly opened for furnishing three main control boards; supervisory control and selective indicating telemetering equipment; 3,000 ft. carrier-frequency coaxial cable; 600-kva indoor unit substation; and three 15-kva distribution transformers for the Coolidge, Prescott, Mesa, E. D. No. 5, Tucson, and Cochise substations and Phoenix dispatching office, Davis Dam Project, Arizona-Nevada. Delivery is desired within 400 days. For particulars, address Bureau of Reclamation, Building 1-A, Denver Federal Center, Denver, Colorado.

MICHAEL W. STRAUS, Commissioner. (104)

TURBINE STEAM-ELECTRIC SUPERVISOR

A physically and mentally active turbine Steam-Electric Station Engineer to, under an active superintendent, supervise mechanical (only) operation and maintenance of a medium pressure, medium sized turbine plant. Only one having a wide range of detailed experience with and knowledge of boilers, turbines, condensers, machine shop practice, boiler, piping and general all round maintenance can qualify.

If you are of the "executive" or office type you will not fit in. It is an active "get around and get into things" kind of a job, requiring an intimate, personal background of experience with all phases of mechanical operation and maintenance.

Absolute sobriety, dependability and good character are "musts." If you have the experience and personal characteristics outlined and think $400.00/month, slightly plus, as an ultimate rate is a good figure, write, giving full outline of education, experience and work references. All confidential, of course.

P-9241, Electrical World, 330 W. 42 St., NY 18, NY

Sales Engineer

Recent college graduate, preferably with Electrical Engineering background, for public utility sales and promotional work in Hudson Valley area. Must possess general qualifications suitable for contacts with customers and dealers. Good starting salary and opportunity for advancement.

P-9428, Electrical World
330 W. 42nd Street, New York 18, N. Y.

J. L. HEMPHILL & CO.

ELECTRICAL ENGINEERS & EQUIPMENT

1606 53rd ST. NORTH BERGEN, N. J. N.Y.C. Tel. LOngacre 5-3222 N. J. Tel. UNion 2-7600

MOTORS SQ. CAGE

1—450 HP.—Ridgeway 900 rpm 2200v.
1—125 HP. G.E., 1800 rpm 2300v.
1—100 HP. Whse., 1800 rpm 440v.
1—100 HP. Whse. 1200 rpm 2200-440v.
1— 75 HP. Whse, CS, 1200 rpm, 2200 volts, 3 phase, 60 cycle.
1— 75 HP. 1800 rpm Westinghouse, 440 volt.
1— 75 HP. General Electric Type KT 900 RPM 440 volt.
2—40 HP. G.E., 900 rpm 220v.
40/20 HP. Westinghouse 600/450 44 volt.

MOTORS SLIP RING

1—2500 HP G.E. MT 257 RPM 6600 volt.
2— 150 HP G.E. Type IM 450 RPM 440 volt.
1— 100 HP G.E. Type IM 400 RPM 440 volt.
1— 100 HP G.E. 720 rpm 440v, 25 cy. IM.
75 HP. G.E. 1200 rpm 220v, 60 cy. Vert.
60 HP. West. 900 rpm 2200v, 60 cy. Vert.
50 HP. F.&M. 1800 rpm 220v. 60 cy.

MOTORS—D. C. 230 VOLTS

1—125 HP. G.E. 1800 rpm R.C.
1— 75 HP. 805 rpm General Electric.
1— 50 HP. 700 rpm Crocker-Wheeler.

VARIABLE SPEED—220 VOLTS

1—35 HP. 300/1200 rpm Westinghouse.
1—30 HP. 440/1200 rpm General Electric.
2—25 HP. 650/2200 rpm Westinghouse.
2—25 HP. 300/900 rpm Electric Dynamic.
1—55 HP. 500/1500 rpm General Electric.

MOTOR GEN. SETS

1—1000 KW Westinghouse 275 volt, 720 RPM 4000 volt Syn.
1—1000 KW General Electric 600 volt 514 RPM 4000 Volt Syn.
1—500 KW. G.E. 250v 900 rpm 2300v Syn.
1—500 KW. G.E. 575v 900 rpm 2300v Syn.
1—125 KW. Crocker Wheeler 1200 rpm 125v Generator 2200v 3 ø. Motor.
1—100 KW. Elect. Mach. 1200 rpm 125v Generator 4150 Syn. Motor.

PLATING GENERATORS

1—1½ KW. G.E. 5/6v with sq. cage m.
1—12 KW. Hansen Van Winkle 24v 1200 rpm.
20 HP. General Electric KF Motor.
1—3000 Amp. Chandeysson, 6/12v 400 rpm Syn. Motor.
1—2500 Amp. ditto.
1—625 KVA West. Reduction Gear Turbo Generator Non-Condensing, 2400v 3 ph 60 cy.

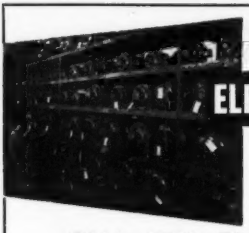
TRANSFORMERS

1—1000 KVA G.E. 3 ph. 4150 volt to 2400 volt.
3— 400 KVA G. E. 4600 V. Pri. 2300 V. Sec.
3— 300 KVA Pitts. 2300v pri. 115/230v sec.
3— 300 KVA G.E. type H. 2300v pri. 115/230v sec.
3— 150 KVA West. 2300 volt Pri. 240/480 sec.
1— 150 KVA G.E. 2500v 110/220v.
3— 100 KVA G.E. 4150v. 240/480v. Pyranol.
3— 100 KVA G.E. 4150 v 230/460 v Pyranol.
3— 75 KVA Amer. 2400v. pri. 240/480 sec.
6— 50 KVA West. 2300 v. 120/240 v. Interleen.

ALTERNATORS & SYNCH. MOTORS

1—2500 KVA Westinghouse, Syn. condenser, 720 rpm 2200v with D.C. exciter.
1—320 KVA Allis Chalmers, 450 rpm 480v.
1—240 KVA General Electric ATB, 600 rpm 240v with D.C. exciter.
1—225 KVA 514 rpm 600v Westinghouse.
4—200/100 HP. Whse. 720/360 rpm 4150v.
1—200 HP. General Electric 257 RPM 440 volt.
1—100 HP. G.E. type TS 600 rpm 4400v D.C.
2—150 HP. Allis Chalmers, 360 RPM. 2200 volt.

Complete Line of A.C. and D.C. Motors and Generators



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ELECTRICAL POWER EQUIPMENT

WE CARRY A COMPLETE STOCK OF

QUALITY GUARANTEED "REBUILTS"

Our facilities for rebuilding and repair work are of the finest in the Nation and are supplemented by a staff of thoroughly competent and experienced engineers.

HERE'S A PARTIAL LISTING
If you don't find what you need—
WIRE—WRITE or PHONE

WE CAN SUPPLY IT!

SQUIRREL CAGE MOTORS

H.P.	Make	Type	Volts	Speed
1250	Al. Chlrs.		2300/4000	3600
750	Gen. Elec.	56947 KF-	2300	1800
500	Gen. Elec.	KTP	440	1800
350	Westchse.	CS	2200	900
250	Gen. Elec.	IK	2200	900
200	Westchse.	CS	440	720
150	Gen. Elec.	TEFC	550	720
100	Al. Chlrs.	AR	440	514
100	Al. Chlrs.	AR-SB	2200	1200
75	Gen. Elec.	IK	440	720
75	Al. Chlrs.	AN	440	1200
60	Al. Chlrs.	AR	440	514
50	Westchse.	CS	2200	900
30	Gen. Elec.	KT	440	900
25	Cr. Wh.	115Q	220	1200

SLIPRING MOTORS

3000	Gen. Elec.	IM	2200	120
1000	Al. Chlrs.	Any	2300	240
800	Westchse.	CW	6600	440
750	Gen. Elec.	MT-16	2200	450
500	Ideal	AV	2200/4000	1800
400	Al. Chlrs.	ANY	4000	514
350	Gen. Elec.	IP	2300	720
300	Al. Chlrs.	ANY	2300	720
250	Cr. Wh.		440	600
125	Gen. Elec.	IM	2300	720
100	Al. Chlrs.	ANY	440	720
60	Westchse.	CW	2300	870
30	Galewin	Crane	440	900
15	Al. Chlrs.	ARY	440	900
11	Westchse.	CW	440	1100
7½	Gen. Elec.	ITC	440	1200

SYNCHRONOUS MOTORS

2100	Gen. Elec.	ATI	4600	514
1000	Westchse.		2300	900
800	Cr. Wh.		440	300
500	Gen. Elec.	TS	2200	900
450	E.M.		440	240

MOTOR GENERATOR SETS

1000 KW generator, General Electric, type MPC, comp. int. 275 volt, 514 RPM, direct connected to 1120 KVA synchronous motor, General Electric, type TS, 3 Ph., 60 cy., 4600 volt, 514 RPM, on fabricated steel sub-base. All complete.

500 KW MOTOR GENERATOR SET

500 KW DC generator, General Electric type MPC, comp., int. 250 volts, 720 RPM, direct-connected on fac. base to 710 HP synchronous motor, General Electric, type ATI, 3 phase, 60 cycle, 440/2300 volts. All complete.

2 COMPLETE VARIABLE VOLTAGE DRIVES

M. G. SET 200 KW DC generator, General Electric, type MPC, 250 volts, 800 amps, 1200 RPM, direct connected to 300 HP synchronous motor, General Electric, type TS, 3 ph, 60 cy., 440 volt, .8 P.F. 1200 RPM. D.C. Motor 250 HP General Electric type MPC, form A, 245 volts, 730/975 RPM. With Complete Starting and Control Panels.

CHICAGO ELECTRIC

Has a modern up-to-date plant where all equipment is fully and skillfully rebuilt and houses a tremendous stock of . . .

- AC MOTORS
- DC MOTORS
- GENERATORS
- M.G. SETS
- CONVERTERS
- COMPRESSORS
- SWITCHBOARDS
- TRANSFORMERS
- CONTROLS
- PUMPS

If you have an electrical power problem write us specifications and full information and we will be pleased to serve you.

WRITE US YOUR NEEDS TODAY

First Source for 39 Years for Quality Electrical Equipment

CHICAGO Electric Co.

1324 W. CERMAK ROAD CHICAGO 8, ILLINOIS
Phone: CAnal 6-2900

TRANSFORMERS

FOR SALE

3—500 KVA A-Ch	33000—2300
6—333 KVA G-E	33000—2300/4000Y
3—333 KVA G-E	13800—120/240
6—333 KVA G-E	2400—240/480
2—200 KVA G-E	6900/11950Y—460/230/115
4—150 KVA G-E	22000—2300/4000Y
3—150 KVA G-E	6600—220/440
3—150 KVA W H	6900—460/230/115
3—150 KVA L-M	2400/4160Y—120/240
5—100 KVA G-E	33000—2300
1—100 KVA G-E	13200—2400
3—100 KVA G-E	11000—2300/4000Y
4—100 KVA G-E	6600—220/440
3—75 KVA W-H	230/460—115/230 DRY
3—50 KVA G-E	33000—2400/4160Y
3—50 KVA Pitts	24400—2300/4000Y
3—50 KVA W-H	4800/8320Y—120/240
6—50 KVA Pitts	2400—120/240
3—37½ KVA Mal	13200—2400/4160Y
6—37½ KVA Mal	13200—120/240
3—37½ KVA W-H	6600—220/440

TRANSFORMERS

WANTED

Reliable rewind and repair service on all makes of transformers.

THE ELECTRIC SERVICE CO.
Cincinnati 27, Ohio

TRANSFORMERS *FOR SALE*

12—1000 KVA G.E. Pri. 2300 to 13200 Sec. 230 to 2300, 1 Ph. 60 Cy.
9—300 KVA West. Pri. 2300 to 13200 Sec. 230 to 2300, 3 Ph. 60 Cy.
3—75 KVA G.E. Pri. 2300 Sec. 230/115, 1 Ph. 60 Cy.
2—150 KVA Eisler Pri. 2300/4600 Sec. 230/460 3 Ph. 60 Cy.
3—150 KVA G.E. Pri. 2300/4000Y Sec. 115/230 1 Ph. 60 Cy.
3—100 KVA G.E. Pri. 6900/11950Y Sec. 230/460 3 Ph. 60 Cy.
1—1000 KVA West. Pri. 2300/13200 Sec. 230/2300 3 Ph. 60 Cy.

PARTIAL LISTING — SEND US YOUR INQUIRIES — WE HAVE IT. TRANSFORMERS BUILT TO YOUR SPECIFICATIONS, REPAIRED AND REWOUND.

BUFFALO TRANSFORMER CO.
1513 Niagara St. - Grant 2716 - Buffalo 13, N. Y.

Relay Control ELECTRICAL CABLE

44—Conductor Copper, 1 Square MM (equal to #17 AWG) 4/64" watertite insulation cabled together.
Manufactured by Okonite and called "Armortite" this cable is used for direct burial without conduit.

JEFF LEE PRODUCTS
1919 Derry Street Harrisburg, Pa.

Motor Generator Sets—3 Ph. 60 Cy.

K.W.	Make	R.P.M.	D.C. Volts	A.C. Volts
1—1800	G.E.	600	125/250	4150
1—1500	G.E.	600	600	2300/4150
1—1500	G.E.	360	275	2300/4600
1—1250	G.E.	600	275	4150
1—1000	Whse.	514	250	4000
1—1000	Cr. Wh.	720	250	2300/4150
1—800(3ph	G.E.	1200	120/240	2300
1— 500	G.E.	720	600	2300/4150
1— 500	G.E.	720	125	2200/4400
1— 400	G.E.	729	250	2300
1— 400	G.E.	1200	120/240	440
1— 350	G.E.	900	125	4150
1— 250	Whse.	1200	250	440
1— 150	Cr. Wh.	1160	250	220/440
1— 100	G.E.	1170	125	220
1— 100	G.E.	1200	250	2200

BELYEA COMPANY, INC.

51 Howell Street, Jersey City, N. J.

Power Equipment

Released by Utilities & Industrials

Turbines, Generators, Steam and Oil Engines, Boilers, Motor Generators, Rotaries, Transformers, Motors, Compressors, Induction Voltage Regulators, Oil Circuit Breakers, etc.

Service backed by 40 years' experience

BREW, WOLTMAN & CO.
52 Church St., New York 7, N. Y.

3—G.E. 1 PHASE SELF COOLED

TRANSFORMERS

Rated 333 KVA; Type H; Form K2D; 33000-2400/4160 Y Volts 55 Deg C Rise Impedance 5.25%. Weight each is 5350 lbs. Taps on High Voltage Side for 33825, 33000, 32175, 31350, 30525 Volts with External Tap Changer. Serial Nos. 6416903, 6416904, 6416905.

Village of Skaneateles, Light Dept.
Village Clerk
Skaneateles, New York

For Sale
Generator Voltage Regulators

General Electric GDA, Westinghouse Silvertat, Allis-Chalmers Rocking Contact, for AC and DC Generators All Sizes Available for Quick Delivery.

Western Regulator Exchange
1730 Wazee St. Denver, Colorado

For Sale—Rent—Hire

HIGHWAY EARTH BORING MACHINE
Mounted on International T.D.-6-Tractor

WILLIAM E. BROWN
R.D. #2, Valley Vue Olean, N. Y.
Phone 5541

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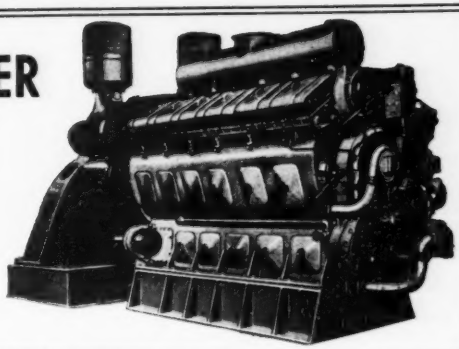
IMMEDIATE DELIVERY

UNIT CAPACITIES—10 TO 1420 KVA
A. C.—50 AND 60 CYCLES
ANY VOLTAGE



A PARTIAL LIST OF OUR INVENTORY

KVA	Make	Model	HP	RPM	KVA	Make	Model	HP	RPM
1420	Fairbanks Morse	38D8⅛	1600	720	375	Enterprise	DSG-6	450	450
1250	General Motors	16-278A	1600	720	312	General Motors	8-268A	450	1200
1000	General Motors	12-278A	1200	720	187	Ingersoll Rand	S	225	514
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BOOK REVIEWS

Electric Power Engineering in Germany 1939–1945. By G. R. Peterson. Obtainable from British Information Service, 30 Rockefeller Plaza, New York 20. 56 pages, illustrated. Price 45 cents postpaid.

Members of the British Intelligence Objectives Subcommittee visited Germany to analyze what progress the Germans had made in electrical technology. The reports of these experts have been summarized here and provide in somewhat more compact and assembled form what our own investigators put together. The scope is from turbogenerator to primary batteries. Significant developments include the rectifiers (especially for the 800 kv project), air breakers, resistance switching, cables, Petersen coils, synthetic insulants, lead alternatives, contact-convertors, nickel-cadmium batteries (somewhat derogated by the investigators). One concludes again that we had little to worry about in connection with German power technology.

***The Mathematics of Circuit Analysis.* By E. A. Guillemin. Published by John Wiley & Sons, New York 16, N. Y. 590 pages, illustrated. Price $7.50.**

Engineers of the MIT faculty collaborated in this fourth volume of a series aimed at framing a group of non-overlapping texts presenting successively and coordinatedly the principles of electrical engineering. Essentially mathematical the applications here are inferred rather than explicitly mentioned and the treatment is designed to be explicatory rather than academically rigorous. The major subdivisions are addressed to determinants, matrices, linear transformations, quadratics, vectors, complex variables, Fourier series and integrals—all tools of advanced engineering substantiation and analysis. The subject matter picks up where the conventional undergraduate course terminates and is thus ideal for the engineer intent on delving deeper into analysis.

Printing and Promotion Handbook. By Daniel Melcher and Nancy Larrick. Published by McGraw-Hill Book Co., New York 18. 386 pages, illustrated. Price $6.

Engineers who live up to their civic responsibilities usually get into some activity that involves the printing of literature in furtherance of some worthy cause. But the mechanics of promotional makeup, printing, duplication are seldom familiar to engineers. That is where this packed-with-facts book has virtue. It is set up in alphabetical glossary manner for ready location of any topic. When are letterpress, photo-offset, mimeo, hecto and photostats the best way? What binding to use? What are standard paper sheet sizes? What does color printing entail? How to estimate words per page? Suitability of illustrations for photoengraving? What are approximate printing costs? These are just a very few of the practical questions answered in ample detail and well-balanced explanation.

Elektrische Messgeraete and Messeinrichtungen. By Albert Palm. Published by Springler-verlag, Berlin (Charlottenburg 2). 284 pages illustrated. Price, DM 21.

This is third edition (first 1937) of a text treatise of measuring instrument design, calibration and application. The added material pertains to watthour meters and electron-tube adaptations to measurement.

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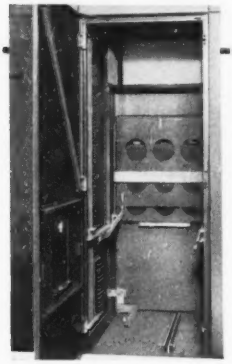

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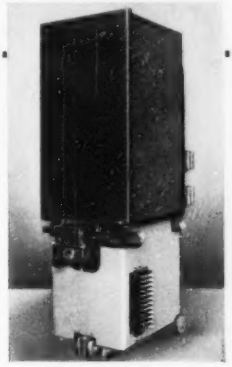

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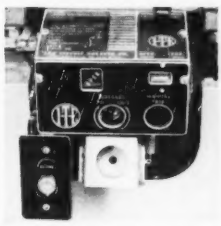

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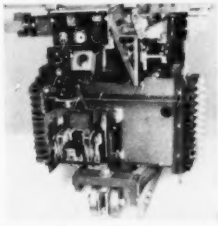

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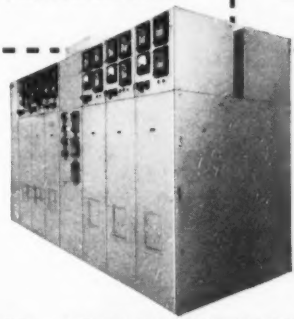

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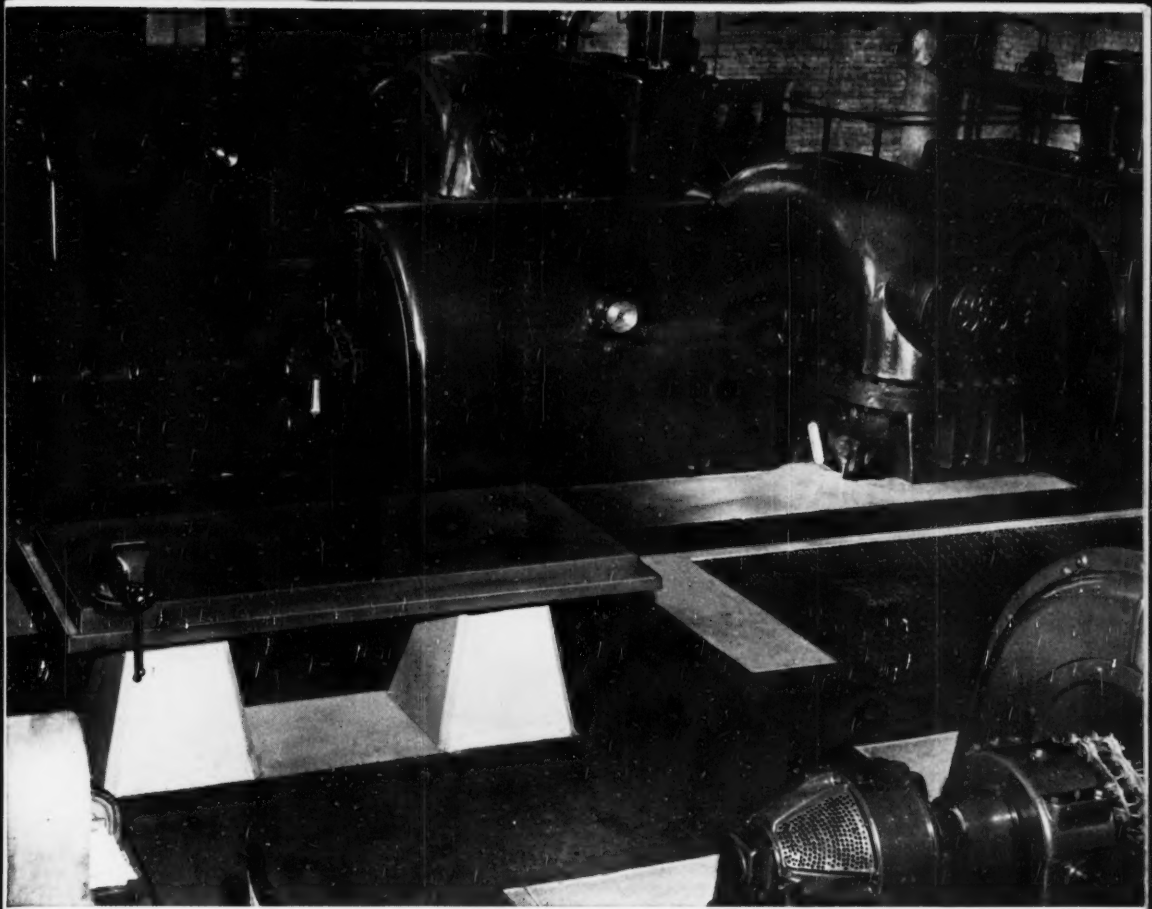

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